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JOHN AND MARTHA DANIELS

SPORTSMEN'S ENCYCLOPEDIA

VOLUME II

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VOLUME II

Compiled by

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Bruin in the mountains.

THE BOW AND ARROW

The recent war, with its revival in new and more efficient forms of medieval weapons, seems also the have awakened the general interest of sportsmen in the gun's predecessor, the bow and arrow.

Four hundred years ago the bow and arrow held first place; now it has well nigh disappeared from the face of the earth as a weapon, except in the hands of the few savage peoples remaining, as yet, untouched by white man's influence.

It was to satisfy an ungratified curiosity on the subject that the writer spent on different occasions considerable time and not a little money on investigation of and experimentation with the possibilities of archery. As a gun crank, target shooter and hunter the writer necessarily considered, more or less from the viewpoint of one curious to know, the bow as compared with the firearms of to-day, and to what extent a bow could be made to serve practically the modern hunter, if at all.

Several years of traveling and residence in different parts of Central America gave the writer opportunity to see and experiment with native Indian bows and arrows. Wherever the Indian has been able to obtain firearms, the bow has been practically discontinued years ago in favor of the gun, usually smooth-bore and muzzle-loading. The bow is, however, often retained for shooting fish and small birds. Central American bows seem as a general thing to be rather short and doubtless they are made this way because a longer bow would be objectionable to carry about in thick jungle. The wood of which they are made varies but is frequently some one of the various species of palm. The arrows are usually of reed, tipped with a heavier wood, often black palm, and are not always feathered.

A visit to the Museum of Natural History in New York City and a later visit to the New National Museum in Washington, D. C., incidental to a trip to the "States" gave the writer opportunity to acquire still further first hand information, for, through the courtesy of Mr. Allen, of the New National Museum, whose thoughtful courtesy and friendly interest will always be pleasantly remembered, he was enabled to spend considerable time on different occasions investigating and experimenting with old Indian weapons.

The character of these bows varied considerably, perhaps the most interesting point being ingenious methods of increasing their power and efficiency, and this brings us to the subject of the reinforced, or "backed" bow. In its simplest form this consists of a heavy cord strung along the back of the bow (the side away from the shooter) and so secured that it cannot slip off. As the bow is bent this reinforcing cord is, of course, tightened and the power of the bow somewhat increased. Another, and better method of re-inforcing bows is, to imbed animal sinews or rawhide on the back of the bow in blue. The sinews are, of course, glued on lengthwise and the work very neatly done. Bows of two kinds of wood, glued together, are made to-day by manufacturers of modern archery goods.

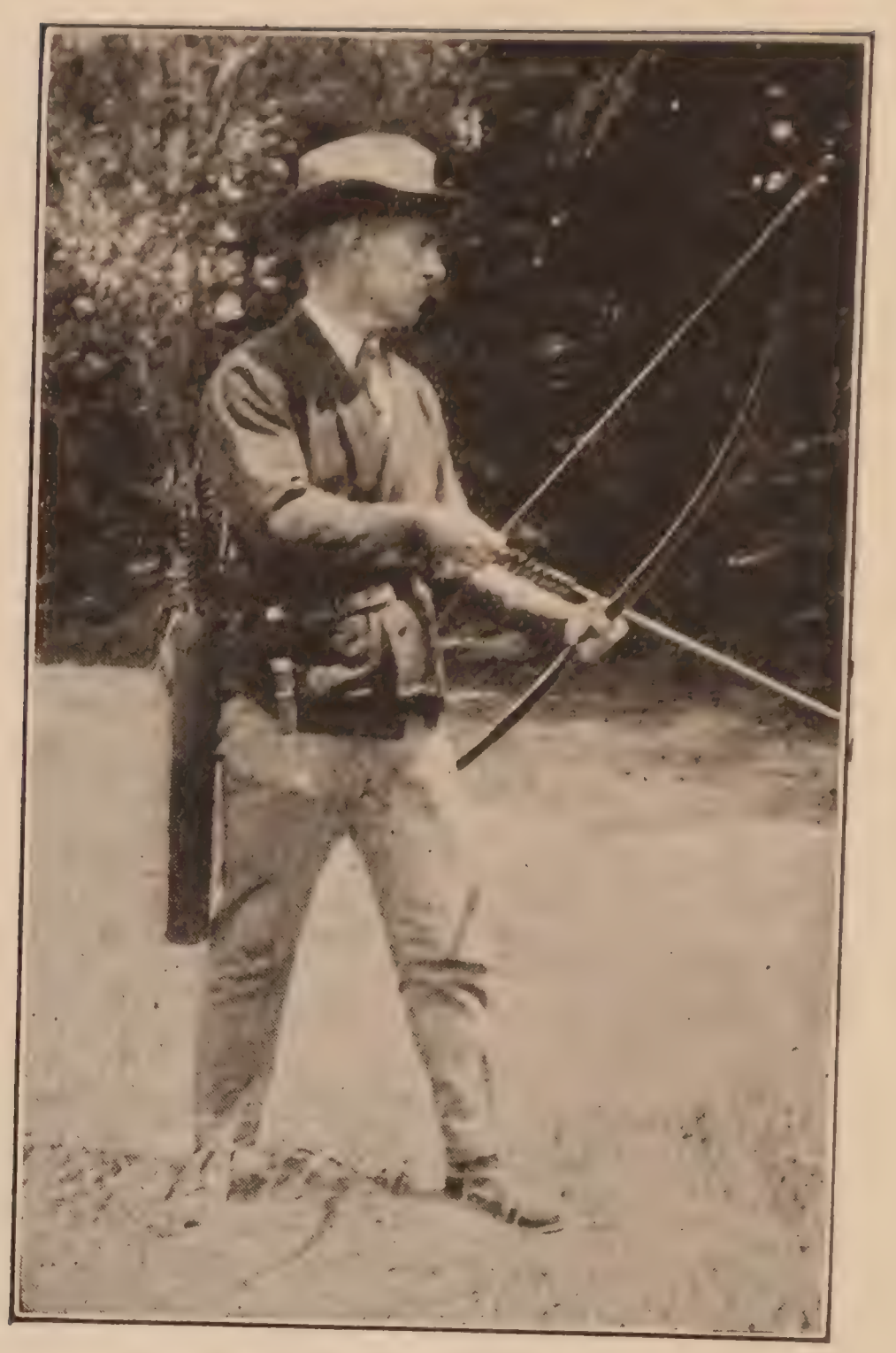
Arrows vary greatly according to their place of manufacture and the purpose for which they are intended. The essential thing about an arrow is that the forward end be heavier than the rear, i. e., the heavy end goes ahead and the lighter end trails behind so there is no tendency for the arrow to turn end for end in its flight. It will be seen that with an arrow of this type feathers are not really necessary, though they aid in keeping the arrow on a true course. In fact, in competitions where shooting for distance only is tried and accuracy is an minor consideration, unfeathered arrows are sometimes used, for feathering adds resistance to an arrow's flight through the air

and slightly retards it. The usual "flight arrow," however, has small feathers. However, if an arrow be of equal weight throughout its length, or nearly so, feathers at the rear are necessary in order to preserve its straight course. In the highest development of arrows, for example those made by regular manufacturers of archery goods, such feathers are very carefully put on and are located to the very best advantage. In many of the Indian arrows, however, the feathering is often simply one, two or three bird feathers, sometimes tail feathers, tied to the arrow near its base by the quill end, the tip of the feather being left free. A rather crude arrangement but it served the purpose after a fashion. While feathers were usually available, cotton or shreds of bark were sometimes used instead.

The point of an arrow itself has taken many forms, depending on the purpose for which it was intended. For small bird shooting the blow given to a bird by an arrow would be sufficient to bring it down. It would also be most highly undesirable to have an arrow, made at the cost of much time and labor, lost by being stuck in a high tree branch. Worse still, if a bird were impaled by an arrow and both bird and arrow lost! Therefore arrows made for shooting small birds in trees were commonly made with blunt point so that they would fall to the ground and not stick in the tree.

As might be supposed, the older men of a tribe or the crippled naturally became the makers of bows and arrows or the "bowyers" (though the work did not necessarily all fall to them), an occupation which contributed to their support, as the younger warriors who were actively engaged in the chase or warfare bought their product.

To these older men, also, often fell the pleasant task of teaching the younger boys how to shoot; as well as how to defend themselves if shot at. The flight of an arrow can be seen; and it has always been a game played more or less frequently among the Indians to shoot arrows at



The first position.

each other at some distance. The person shot at would watch their flight and dodge if necessary or would scornfully stand perfectly still if he saw that the shot would be a miss. Needless to say this is a dangerou game requiring good judgment.

Arrows for shooting large fish are often made with a detachable head, the head being, of course, barbed and made with a socket so that the shaft can slip out of it after it has entered the fish, or else both head and shaft have a socket, a small intermediate piece of wood or bone entering both; this would break or pull out leaving the head inside. Wound about the shaft and attached to it is a cord, the other end of which is attached to the head. When the head pulls off the struggles of the fish loosen and unwind the cord, and as the shaft of the arrow acts as a float the Indian simply has to get hold of this float and pull his fish in. In many cases a plain arrow will suffice or an arrow with a head made with three barbs arranged in the form of a tripod or a trident, but for certain classes of fishing only the detachable head scheme, which has various modifications and varieties, will do.

Arrows warp pretty badly on occasion. The writer is reminded of a story he read as a boy in which a Mexican Indian shot at a turkey and missed it and then exclaimed, "I missed because I forgot to straighten my arrows after they had been wet!" Whoever wrote that corking good story, "Juan and Juanita" knew something about archery for certain it is that arrows sometimes need straightening. For this purpose some Indians used a flat piece of wood with a hole through it somewhat larger than the arrow shaft. The shaft was poked through the hole and pressure applied to it as necessary. Small grooves were sometimes cut along the sides of a shaft which may have had a tendency to prevent its warping, certain it is that they could have had very little effect in letting blood out, and Indians say they were not for that purpose.

War arrows, being intended naturally to injure the

enemy as much as possible were frequently made with barbed heads which would pull off easily and remain in the wound, or the shaft was weakened near the head so that it would tend to break there, which accomplished the same result. Game arrows were generally intended to be extracted from the slain game and used again and were designed with this end in view; but war arrows had a different purpose. The poisoning of arrows was a natural step in an attempt to make them more deadly and it was quite a common custom. Such arrow poisons varied from simple copper points intentionally corroded, to complicated and deadly mixtures, compounded of snake venom and vegetable and other poisons, the exact details of which the writer will not attempt to discuss in a general article. One of the most noted of these poisons is that known as Wourali, Curari, or Oorara and is made and used to-day by our own Central and South American Indians. The writer has talked with men who have seen these poisoned arrows used in actual game killing, and they describe the action of the poison as being very rapid, though it is certain that the speed of its effect is greatly exaggerated in the popular mind. It has to be carried by the blood, and that takes time. This type of poison does not render inedible the meat of animals killed with it. Whether it could ever be used to advantage in game shooting with a rifle is questionable, but think of the possibility of hitting a deer almost anywhere with a .22 short poisoned with Wourali and have it drop within a hundred yards!

Let us, however, consider the bow as a weapon for the modern hunter.

A good bow is nothing to be laughed at; in skillful hands it is a dangerous and deadly weapon as the early settlers, from the standpoint of the men being shot at, had good reason to know. The best results in archery have, so far as records show, been accomplished with the regular long bow of the accepted pattern with arrows to match, the sort of equipment turned out by the best makers of

this class of goods. Such equipment has in it the design and experience gained by centuries of experiment; and it probably cannot be surpassed, certainly it is far superior to that of savage peoples. It is not particularly expensive, reminding one of the cost of .22 rifles before the war. The best men's bows, priced in New York City in 1919 cost, for example, $20.00. Arrows came rather high, ranging around ten dollars a dozen, the cheaper sort are mere toys, and the natural inclination would be to buy a few for samples for length and dimensions and make the rest at home.

The classical rule as to the length of bow is that it be the same as the height of user. A bow of about six feet in length (total length of bow unstrung) is best suited to the average man and the "weight" or strength of the bow will vary from thirty to fifty pounds or more. The writer shoots a sixty-pound bow. The "weight" is the force necessary to pull the arrow back to its head, and can be measured by a spring scales. More powerful bows than this are used, sometimes requiring a pull of seventy, eighty or even ninety pounds to draw, but it takes an old-timer at the game and a powerful man to use these. The strength of a bow's shooting or its accuracy is by no means to be gauged entirely by the amount of bull strength required to draw the arrow to its head, for the elasticity and "kick" or "cast" in a bow, due to the skill with which it is built, have a considerable bearing in the matter. A well-built fifty pound bow will often send an arrow further than one requiring more strength to draw it, but less skillfully made.

A few words as to handling the bow to the best advantage. There are a number of ways but the best shooting is done after the fashion of the old English archers, probably the best bowmen the world has ever known, and the American sportsman is certainly safe in using the method they have developed as a starting point. It is the one generally used by modern archers.

The illustrations show the system perfectly. The bow is grasped firmly with the left hand and held vertically or nearly so. The arrow goes on the left side of the bow and above the hand, but the shaft of the arrow touches the bow midway between its ends for the left hand grasps the bow intentionally just a little below its center to allow for this. Factory-made bows have a hand-grasp placed in the proper position slightly off center and one tip of the bow is usually made different from the other, so there is no difficulty in keeping the bow always right end up. The bow-string is also marked in the center so that the arrow is always placed in exactly the same position.

Pull the string back by the tips of the first, second and third fingers of the right hand, the end of the arrow being between the first and second fingers. The natural inclination will be to hold the bow and arrow at such a height that when the right hand is drawn back the fingers will be on a level with the chin and just under the right eye, and this is the proper position. Draw the arrow clear back to the head. The hold on the bow-cord and arrow just described is a little difficult and seemingly unnatural to a beginner but it is the one with which the best work has always been done and one should learn it in the first place. Releasing the arrow with this hold is simply a case of letting the cord slip off the fingers.

The most natural hold is the "pinch grip," which is the thing one would instinctively do, that is, to take the arrow's end between tip of thumb and tip of forefinger, pull back and "let her go." This answers for a weak bow but no strong bow can be bent this way to the necessary extent. A somewhat better way practised by many Indian tribes was to close the forefinger and grasp the arrow between the middle joint of it and the thumb. Some Indians even made a sort of bulbous enlargement on the string end of the arrow to prevent its slipping when used with a pinch grip.

Some of the Chinese had a radically different, though

efficient way of drawing the bow; and this method was practised by several of the allied races. John Chinaman put the bowstring between the thumb and forefinger at the root of the thumb, turned the thumb in as far as it would go and hooked the forefinger around the end of the thumb to hold it that way. The arrow lay above the thumb, simply resting on it. A wide ring of metal or jade was usually worn on the middle joint of the thumb which prevented the bowstring from cutting into it. The whole idea was on the principle by which the American boy "shoots" marbles with his thumb, except that the marble is ahead of the thumb while the bowstring is behind it. Releasing is, of course, done by a combined relaxing of the forefinger and slipping out of the thumb.

What accuracy can be expected from the bow under average hunting conditions? Can it be compared with the modern sporting rifle for serious game shooting? Let us consider a little. A the present day the hunter armed with a rifle and who is out for meat and not for recreation will naturally get as close as possible to an animal before shooting, thereby increasing his chances for a kill. The bow and arrow hunter has always done the same thing and because his weapon was less powerful and less accurate his skill in woodcraft was necessarily correspondingly greater. Hiawatha killed his first deer, you will remember, by hiding in an alder thicket beside a deer trail.

"Hidden in the alder bushes,
There he waited till the deer came,
Till he saw two antlers lifted,
Saw two eyes point from the thicket,
Saw two nostrils point to windward,
And a deer came down the pathway."

To distinguish the deer's eyes and nostrils he necessarily had to be pretty close and its safe to say that he also kept away from the windward side of that deer trail too, lest the deer scent him. The probabilities are that Hiawatha

Full drawn.

shot that deer at fifty feet, or less. By way of comparison it may be stated that this is about the extreme sure kill range of buckshot.

A man of wide experience with Indian hunters said that in his opinion the greater part of their game killed with arrows was shot on the short side of twenty yards, and this seems probable. The Indian got as close as he could before shooting and tried to make his kill a sure thing and if the white hunter of to-day would more generally follow his example there would be less crippled and lost game and probably fewer people shot by mistake as well.

The records for accuracy have, of course, been made by the white man with his superior weapons. These authentic and comparatively recent cases of shooting, as done by experts in the game, will give an idea of what degree of accuracy may be obtained, given proper equipment backed by careful practice. The list is taken from "The Witchery of Archery."

20 shots	4 ft. target	100 yds.	time, one minute
12 shots	2 ft. square	46 yds.	.....
10 shots	8 in. square	30 yds.	.....
11 shots	9 in. bull	40 yds.	13 arrows fired

This is approximately equivalent to the degree of accuracy that would be obtained by an average good shot with a heavy calibre revolver or pistol at these distances. An exceptionally expert pistol shot with special arms and under favorable conditions would do much better.

Speaking in a general way, an expert archer under average favorable conditions will be able to hit a mark one inch in diameter for every ten feet of distance, this with reasonable certainty. Some will do even better than this but most people far worse, due to lack of interest and practice, or poor equipment. This is not gun accuracy but it is sufficient for much small game work and for big game work where it can be approached closely. Pope and

Young and others have killed grizzly and black bear, deer, puma, and all sorts of varmints. This class of work means woodcraft of a high order, skill and nerve, for it takes physical bravery of the highest order to hunt, face and kill a grown grizzly as these men have, depending on bow and arrow.

The range and penetration of arrows is far greater than is generally supposed. Shot from a powerful bow at short range an arrow will pass entirely through a deer or bear, cutting a rib or two in addition if they happen to be in the way. Contests are often held in which the object has been to attain long flight, accuracy being a non-essential, and in such matches flight shots of over two hundred and fifty yards are common. Rapidity of fire is obtained by the archer simply sticking a number of arrows in the ground in front of him or holding several in his left hand. Through long practice he can grasp and fire them very rapidly without taking his eyes from the mark.

In many cases the bow can be used to good advantage in procuring large fish, and with blunt arrows it will account for many an English sparrow at short range. Fix a sort of "tit-tat-toe" (you remember the child's game) arrangement of cross sticks or wires on the end of the arrow to increase its area and effectiveness. If your bow isn't too powerful and you use a blunt arrow it is the ideal way of indicating to bird-hunting cats, the dog from next door that digs a hole in your smooth shaven lawn big enough to bury a cow in, and the chickens that scratch up the flower bed that they are all strictly, "personae non grata" in that neighborhood, while the total absence of noise, barring the remarks of the beast reasoned with, has its advantage.

Aside from this, there is a certain pleasant satisfaction in the possession of what has been for ages mankind's best weapon, and in having acquired the knowledge and skill to use it.

VAN ALLEN LYMAN.

RIFLE SHOOTING

Having seen many articles on the art of deer shooting, some good, others different, I feel constrained to dip into the subject myself and unload a few suggestions.

First and foremost I want to go on record that I am not writing to you about that running deer that pops up from nowhere, flashes into sight, and is gone again in the twinkling of an eye. To get that deer any hunter will admit that it's a quick shot pure and simple. The rifle jumps to the shoulder, goes off, and—so does the deer in a great many instances. No, I refer to the normal case where one has an appreciable time, a few second suffices, in which to shoot and, as often happens, that first shot turns out to be the last; success or failure for the hunting trip depending on that one opportunity to down your deer.

The point that I want to bring out strongly is that most deer are killed standing and for that reason I want to emphasize the necessary rules to govern that form of shooting for, until one has mastered that class of rifle shooting, he is not prepared to proceed to the more difficult art of "running game shooting."

It matters not what kind or make of rifle one uses,—we all have our pet ideas on that subject. The prime essentials of good shooting are the same for all grades and makes.

Both experience and the teachings of some of the foremost rifle shots in the U. S., have conclusively shown that good rifle shooting hinges on the cardinal points of correct position of both body and rifle, proper aiming, and last but most important that little known and less practiced "art" of squeezing the trigger.

Once these points are grasped and thoroughly digested, rifle shooting becomes easy and hits are assured, but like everything else practice and diligent practice is necessary in order to become a finished shot.

Position

The first point to be considered is position. Most shots at deer are fired from the standing position. I state this believing it to be a fact but do not advance the theory that the standing position is the best. Personally I never fire a shot from the standing position that I can fire kneeling, and I always prefer the prone position if time and conditions permit. One must decide instantly the position he is going to fire from and then assume it immediately.

A good standing position is one where the body is half faced to the right, feet about twice their length apart, weight evenly distributed on both feet, left hand grasping the rifle approximately under the balance and pressing it firmly against the shoulder, left elbow well under the rifle and away from the body, right hand at the small of the stock and fingers around it, right elbow at the height of the shoulder and right arm in a horizontal plane, right cheek firmly pressed against the stock.

For a kneeling position the following has been found very satisfactory: half face to the right and sit down on the right heel, left elbow resting on the left knee and in front of it, right arm as in standing position.

In both the standing and kneeling positions it is important to keep the right arm horizontal as this position does not require the shooter to strain his neck to get his head into the proper position for aiming.

A good prone position is one where the body is at about 45 degrees to the line of sight lying down flat on the belly, feet separated, elbows under the body and not so far apart as to cause unsteadiness, chest slightly off the ground, right eye as close to the cocking piece or hammer

as the make of the rifle permits. Do not permit any muscles to be in a strained position as this will cause unsteadiness. If time and your desires permit, use the sling in the kneeling and prone positions. The positions outlined above have been used in the U. S. Army and by many good game shots. These positions are given as a guide and may have to be modified to suit different men. Our doughboys cleaned up in the International shoot in France and good positions among other things had a great deal to do with their success.

For deer hunting on the open mesas and hills one nearly always can assume the prone position, the game being seen from a distance and approaching under cover.

In a number of occasions in the Big Bend country of Southwest Texas I have laid in cover or behind a rock an watched a herd of deer grazing about 200 yards away, waiting for the big buck to turn broadside so that I could put one in just behind the shoulder. I say one, because my .256 by the way is my idea of a real sporting rifle, only has to hit once and I have nice juicy venison steaks and succulent spare ribs already to be broiled.

Sighting

Great care should be used so that the rifle is always vertical and not canted, that is, revolved to the right or left, canting always makes the rifle shoot low and toward the side to which the rifle is revolved. To illustrate: raise your rear sight to its highest elevation and hold the rifle in the aiming position. The vertical distance on the rear sight now represents range only. With the bore of the rifle as an axis rotate the rifle to the right through 90 degrees. Here one can readily see that all range has been taken off and changed to windage. Hence, no matter how little the rifle is revolved to one side or the other you always reduce your range and put on windage towards the side to which the rifle is

Fig. 1.

Fig. 2.

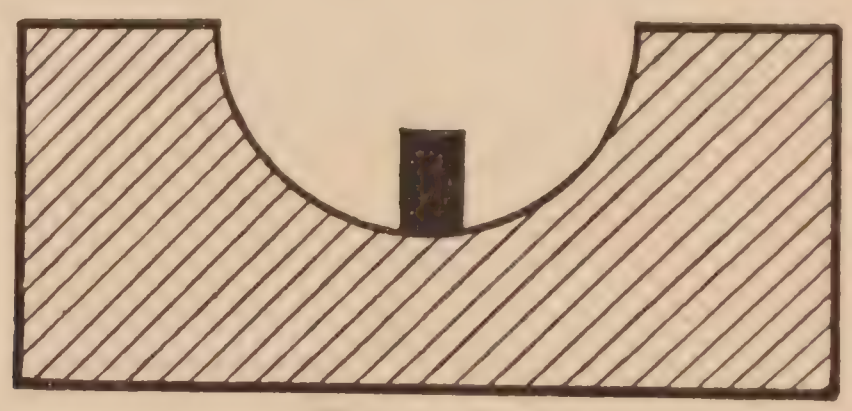


Fig. 3.

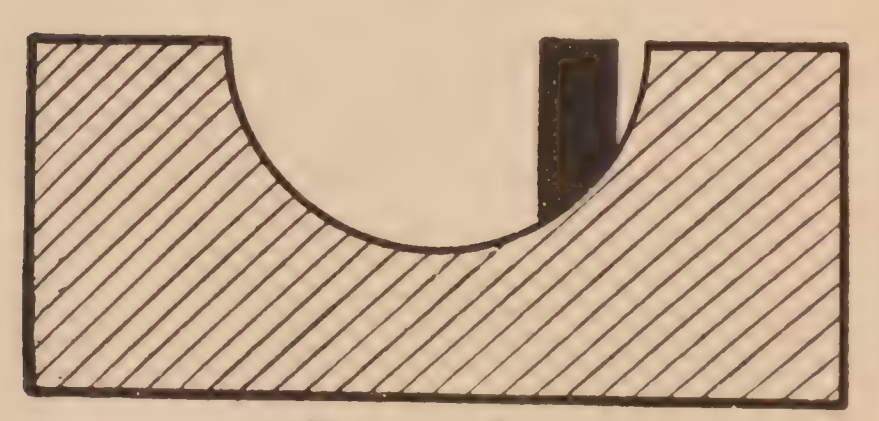


Fig. 4.

revolved and shoot low and either to the right or left depending on which way the rifle was canted.

Many hunters differ in the manner in which they align their sights, some preferring to take a full front sight, some preferring a fine sight and others the various stages in between. The practice of our best shots, however, has established that what is called the half sight is better adapted to all conditions and rifles and is the one advocated in this article.

If a man targets his rifle for a fine sight and thereafter always uses the same amount of front sight, everything else being equal, he will continue to shoot consistently. The same can be said for the full sight.

However, the advantage to be gained by the half sight is that it is much more easily and more accurately taken than any other. By referring to Fig 1, it can be seen that the imaginary line A-B coincides with the top of the rear sight and passes through the top of the front sight as seen in the aiming position. This gives the hunter a definite standard to go by and an accurate guage of just how much front sight he is using and after practice can be assumed automatically and be accurately checked while aiming without loss of time.

On the other hand when one uses a fine or full sight it is especially difficult to always obtain the exact same amount of front sight for a number of shots.

While the sights on your favorite shooting iron may not be as illustrated, yet the principle is there and can be applied to all good forms of open sights.

The same principle applies to the use of the peep sight and it will be a great help if one has a horizontal line put in (See Line C, D, Fig 7) that divides the circle equally, so that in aiming you can always bring the top of your front sight level with this line.

Figures 1 and 7 represent the appearance of the sights, when taken properly. Figures 2 and 3 are incorrect for

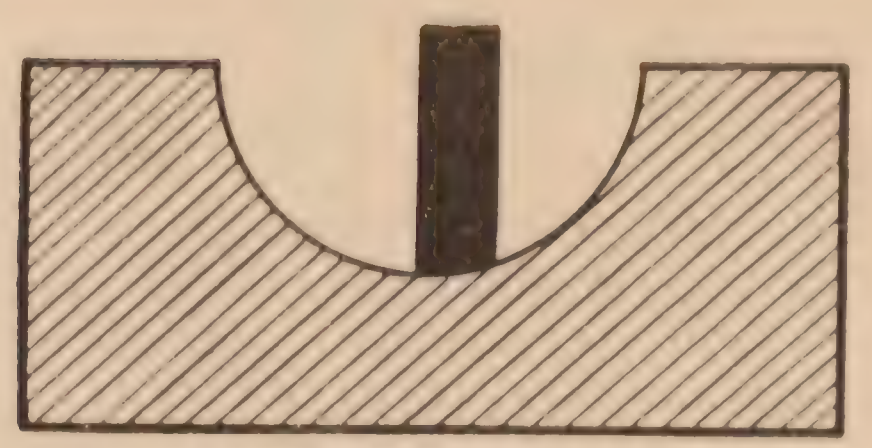


Fig. 5.

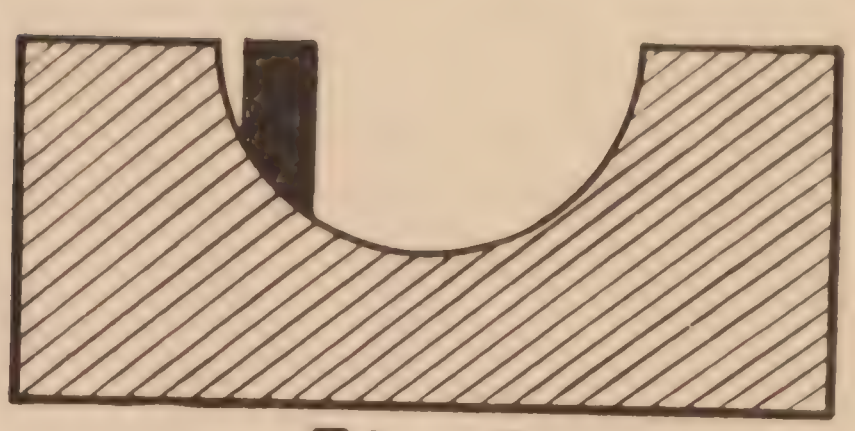


Fig. 6

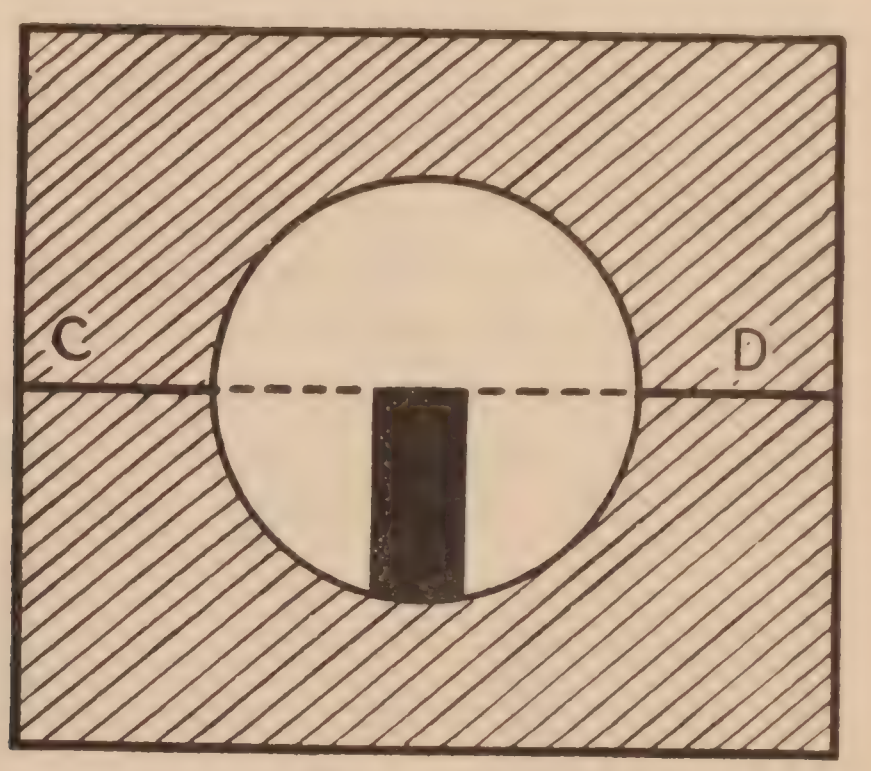


Fig. 7

the normal shot, though when one has thoroughly mastered the art of shooting and can make creditable scores such sights would be helpful for small increases or decreases of the range.

However, this is the exception that proves the rule and should not be done except under exceptional conditions.

Figures 4, 5 and 6, are common errors and should be eliminated. *BE SURE THAT YOUR FRONT SIGHT IS ACCURATELY CENTERED IN THE REAR SIGHT NOTCH IN THE CASE OF OPEN SIGHTS AND IN THE CIRCLE FOR PEEP SIGHTS.*

This point is important and in practice should be watched assiduously and photographed indelibly on your brain so that when you are shooting for meat, any error instantly becomes apparent and is corrected.

Trigger Squeezing vs. Pulling

While aiming, do not breathe as this will derange your aim. It has been found that one aims best with the lungs half inflated.

In practice it has been found best to keep your eye on the target and bring the rifle up to target from below. *ALWAYS FOCUS YOUR EYE ON THE TARGET AND NEVER ON EITHER THE FRONT OR REAR SIGHTS.*

Having acquired the ability to almost unconsciously assume the proper position of both rifle and body and also assuming that the hunter thoroughly understands the principles, and applies them, of proper aiming he is now prepared to finish his education by beginning the all important training of squeezing the trigger. I say that the trigger squeeze is all important because so many game shot fail to consider it at all and as a result they get no further advanced, this being due in a great many cases to improper trigger squeeze or complete failure to squeeze the trigger. Ability to squeeze the trigger is the

deciding factor between good shots and excellent shots so I feel that I cannot lay too much stress on this most important point.

By all means, no matter what rifle you prefer, have some slack in your trigger; that is, a perceptible backward movement before you feel it take hold and the real business of squeezing commences. Jerking the trigger must be eliminated.

In squeezing the trigger the first operation consists in taking up the slack and then exerting a steady, progressive, pressure, so that you do not know exactly when the rifle will be fired. Have your lungs about half inflated while squeezing.

With proper trigger squeezing flinching is unknown because you cannot flinch if you do not know just when the explosion is to take place. If you flinch afterward no damage would be done.

The pressure on the trigger should come from the second joint of the trigger finger and the squeeze exerted by the whole hand, and not by the trigger finger alone. The nearest approach to the proper squeeze can best be illustrated by likening it to the squeeze one exerts with the whole hand when squeezing a sponge.

The prime points to be remembered are that the pressure must be steady while the sights are properly aligned; hold what you have squeezed if your sights come off your target and continue the steady pressure when your sights are again properly aligned.

REMEMBER THAT THE TRIGGER SQUEEZE IS THE MOST IMPORTANT FACTOR IN MAKING HITS, and practise it until you do it properly even though it does become irksome at times. You cannot become a good shot until it is mastered, so in practising position, aiming, and trigger squeeze, the average man can well afford to spend the major portion of his time on this all important point.

I have found about a five-pound pull to be excellent

for game purposes, even for the most difficult of running shots, and combined with a little slack the best all round combination.

When firing at a running deer you still must squeeze the trigger when your sights are where you want to aim, only in this case the squeeze is necessarily faster. Your point of aim for running deer of course varies with the velocity of your bullet, distance from the game, speed of the game, whether running parallel to you, etc. To jerk the trigger under any circumstance is ruinous.

Eyes on Game

Keep your eye on the game all the time between shots and do your reloading as quickly as possible so that more time may be spent in aiming and trigger squeezing. This is important for standing shots and essential in running shots. By keeping your eye on the deer the rifle immediately comes into approximate alignment and no time is wasted in locating the target. Seconds are golden when the big buck jumps so you must remember to load and assume position quickly, thereby allowing more time for aiming and squeezing.

By watching the running deer between shots you may, if you miss, see where your shots struck and be able to correct your error for the next shot.

I know there are some good so-called "snap shots," but I have yet to see one of them who could hold his own with a good "squeeze" shot.

Put up a target in the back yard and devote fifteen minutes a day for two weeks, conscientiously going through the various exercises outlined and then beg, borrow or steal a .22 and fire twenty times deliberately, calling your shot and checking yourself each time to see that you are not committing errors, and the score you make will surprise you.

Before going after that buck spend a little time estimating distances, that is, so train your eye that you are able to tell within a reasonable distance just how far

the game is from the rifle. Why lose him by misjudging the range when just a little effort on your part before hand would have brought you a hit instead of a miss? A few shots at a mark before the big hunt will show you where your rifle shoots besides giving you a chance to try yourself out after having practised the above rules.

I use a 3,000 foot second velocity bolt action gun and have a two leaf rear sight; the first set for 150 yards and the second for 300 yards. I find this combination just what I want as with these two settings I can cover all ranges up to 400 yards with sufficient accuracy to bring home the meat and after all that is the best test to go by.

I use the first leaf for all shots to include about 225 yards, and the second leaf for from 225 yards to about 400 .yards. As these ranges cover all but the most exceptional of game shots I have found it an ideal combination and adequate for my purposes.

An excellent method of targeting a sporting rifle for use on game is to fire several scores at ranges varying from 100 to 300 yards. For this class of firing use a target with a 12 inch white bulls eye with a 10 inch black ring around it. I know of no firm that makes these targets so that anyone desiring to use them will have to make them for himself. The point of aim here is the center of the bulls eye and not just below it as in target shooting against a black bulls eye. With the white bulls eye your sights are silhouetted and errors in aiming can be seen at once. The main point, however, is that you should aim at the exact point you desire to hit, and of course when shooting at game that is exactly what you do. It is a well-known fact that a rifle targeted by holding at six o'clock on a black bulls eye shoots about 5 inches high at 200 yards and, therefore, is not proper for game shooting when one aims directly at the game and desires to hit at the point where the top of the

front sight rests. If you intend to use a rest, sight your rifle for that method as all rifles shoot higher from a rest than when shot offhand. If you intend to do much shooting from a rest you must exercise great care to always rest the rifle at the same point otherwise your rifle will shoot either higher or lower.

As a final admonition, think of what you're doing, hold hard, and squeeze harder, and success in bringing home the big buck is only a question of opportunity to get a crack at him.

Captain John A. Considine.

RIFLE SHOTS THAT COUNT

Some time ago I contributed an article on the mechanics of accurate aiming in shooting game in which my sole consideration for the moment was the subject of proper rifle holding.* At that time there was used a photograph of a standing deer and against this diagram the various sights were placed to illustrate graphically the appearance of the sights when properly adjusted. At once a noted hunter called attention to the fact that as the sights seemed to aim on the body of the buck the shot would be a lung puncture and so a very poor place to hit the animal. This has led me to the consideration of just where to hit a game animal in order to kill it and so reduce his wild nature to your possession with the quickest possible dispatch.

Possibly it would have been better had I pictured those rifle sights in the previous article exactly where the position of the animal's heart was located, but this was not primarily my object in writing that story and I simply saw to it that the aim was toward the front shoulders of the big buck.

But the sighting, which was somewhat high for a heart shot, would have been true enough to have killed the deer if the right kind of a rifle had been used. Five seasons ago I happened to hit a speeding deer in just

exactly that location and he went down at once from the blow of the bullet. Did you ever stop to consider the power in a blow that is struck with the force of a ton or so? If the bullet never entered the body of the animal but should be stopped at the surface of the body, he would go down because of the force, the kinetic energy, the momentum of the impact. This simply means, for practical purposes, that when you shoot a bullet that goes straight through a game animal's body not all of the energy of the bullet is stopped by the target. The old-fashioned guns that old-timers still tote into the field will send their bullets straight through a game animal in fine shape but this is not what counts most. The thing of importance is the blow given by the bullet. For any bullet to give the full shock of its blow it must be stopped, or at least its energy greatly reduced, by passing through the flesh and bone of the game.

It happened that when I got in that lung shot the bullet exploded for the simple reason that the kind of a rifle I believe in shooting is of the type that uses the high velocity, expanding bullet. That bullet did not pass through the body of the buck, but spent every ounce of its force in his front quarters and he was knocked over. Maybe he might have recovered in a few minutes after the shock of the giant blow had left his muddled senses, but he was down and I was right there with another shot to finish him. Remember that he was running his best clip broadside to me and through brush. I was nothing short of lucky to get the bullet into him. A rifle that was built in the '80's and was a mighty good invention for its day would simply have pushed a hole clear through the body of the buck and only expended on him part of its power. The result would have been that he probably would never have been knocked from his feet and so would never have slowed down. The shooter who insists in toting anything but a modern high power, super-velocity, expanding bullet rifle of the

best type ought to take a surgeon along with him into the timber. The need of this surgeon being to mark out on the side of every deer the location of his heart so that the shooter could make no mistake.

I readily confess that I am not a surgeon and never found time under the pressing circumstances in which I have done my game shooting to really stop and locate the heart of the running target. Some men may be able to do that and it is their gift. I must trust a good gun to get them if I am lucky enough to hold it so that it will puncture the front shoulders and knock the game off its feet when hit. I once saw a fox shot with a deer rifle of the expanding bullet type. It was of the small calibre variety and the bullet entered the neck, exploded and failed to come out anywhere along the length of the animal's body. The shooter rather expected that the hide would be ruined but the fact was that the only hole in it was a tiny one where the lead entered. The copper jacket about that bullet mushroomed the tip and the full energy of the bullet's velocity and striking power stayed inside that animal's skin. When that fox was skinned his insides were, in the terms of the man who shot him, "nothing but jelly."

In order to kill your game quickly and surely the right kind of a rifle is necessary first of all, unless you are a skilled game shot and can place your bullet as skillfully as a surgeon wields his knife. I realize that all men do not agree concerning what make of rifle that should be, but such weapons are built by all the big manufacturers today. Whether you like an auto-loader, pump, lever or bolt action; whether you fancy an American or an imported rifle for game shooting, in any case the modern gunmaker will have among his list of products a type that combines a maximum of velocity and hitting power with a light weight. Remember that the higher velocity, and greater powered bullet will often fail to go through as much resistance as the slower bullet. One

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F.E.B.

explodes and distributes all its energy into the resisting game animal's body, the other bores its way clean through. If you think a real high power bullet is "too wicked" then shoot the slower velocity with more weight to make up for lack of speed, which is necessary to get the foot-pounds of striking power, and you will surely get your game if you can hold right on his heart, his back bone, his spine where it passes along the neck, or his head.

I know a shooter who has killed game of the big type and he always tries to hit them in the head. He is a skilled marksman and has shot the same rifle for two score years. He has his own method. For me I have got to take along a rifle that will knock them clean off their feet if I hit at all and so give me a chance to slow them down and get in a sure shot later if necessary.

I certainly would do all in my power to get in a heart shot if I could, but there is the problem of sighting through trees; probably the game is moving; the light may be poor; the shot may be a long one; the time given for aiming probably is short; all of these and many more considerations that confront the shooter make it almost impossible to place your bullet just where you would like it.

On the sketch the circle at No. 1, would certainly be about an ideal place to plant one's bullet if you had your game tied to a ten-foot rope and the end of the rope secured to a stake, provided the animal was considerate enough to stand pretty quiet for you, the distance was not too great and the light and other weather conditions were favorable. I have seen a good many game animals brought down because a lucky shooter had gotten in the heart shot at No. 1, and surely every hunter ought to try for it. But I have seen ten animals killed by other than heart shots to one by that shot. For that matter I have seen an animal run a quarter of a mile with the tip of his heart shot away.

A good many shooters who go into the big timber and bring home trophies every season say that they always aim for the circle at No. 2, if the circumstances permit of more than a hasty bead on the front quarters. The advantage of a bullet placed in this location on moose, caribou, goat, bear, sheep or deer is that the bullet is pretty liable to shatter the shoulder as well as rip open the cavity of the vital organs. Hence for two reasons it is a good place to hit game. It not only is a shot that has in it all the possibilities of a kill but also it disables the game so that he isn't so liable to crawl away into the bogs with the last ounce of fading strength and get away from you. Another advantage of this shot is that it makes any rifle furnish the whole power of its blow to the game. The bone breaks the power of the bullet, probably causing it to burst, and so the whole momentum of the missile is stopped by the body of the animal.

Another pretty deadly location to place a bullet is in the circle at No. 3. Of course you have here the double possibility of the big neck artery and the spine. To hit either will cause a sure kill. In fact with a high velocity rifle any location in the neck where the bullet can be placed is sure to be effective. Last fall I saw the neck of a small deer practically cut clean off with the speediest sporting bullet on the market. I once shot a buck at two hundred yards standing in a swamp where the alders concealed all but his head. The bullet hit him in the neck. He was looking straight at me and stood with the body ended in my direction. The power of the exploding bullet caused him to summersault in the air so that I plainly saw his feet over the top of the bushes as he was whirled over. I found him in a heap right in his tracks. The high-velocity bullet had spent every ounce of its energy right in his neck and that was enough to kill him instantly and on the spot. I have not indicated the head shot in the sketch because few shooters prefer it and certainly it will not be practiced by anybody who is after trophies. I

suppose it was popular with the meat shooter of half a century and longer ago.

The circle at No. 4 might be a bad or a good place to hit your game. If it was lower it would be a lung-shot and so not get your game until he had gone some distance. At least not if you shot a low-power bullet. If you hurled a high velocity missile into him right through the lungs I'll bet he would go down. He might collect his wits and try to get up, maybe, but at least you would have given him a knock-out drop or have temporarily stopped him, and you could easily put in the finishing touches while he was at this disadvantage.

The lung-shot happens very often when shooting running game for the reason that, when a broadside target is presented, one is pretty liable to forget that the bounding animal rises and falls so that an aim that would be correct for a heart-shot would result in a lung puncture because of the fact that the body of the animal fell a few inches during the time taken for the bullet to touch him after the trigger squeeze. If the animal was rising just as the bullet touched him the aim for the heart-shot will not very likely be a clean miss, passing somewhere near circle No. 10, for the reason that the target had risen something like six or eight inches during the interval necessary for the missile to go from muzzle to mark.

A shot that I have found to be very effective in the case of game running broadside is one that strikes in the neighborhood of circle No. 5. This results in breaking both front legs and comes about as close as possible to stopping the game in your vicinity. Just the same I have seen a big buck run for a little distance when hit thus in his rear legs alone. A hit in the forelegs, which seem to be held pretty closely together in the running movement, will stop your quarry long enough for a shot that will finish him and is one that presents itself to the game shooter far more times than that of breaking both rear legs at one shot. Of course the hind legs are usually

further apart and this must be the reason why only one rear leg is generally hit at a time. Understand, I am speaking of a broadside shot or one that is at a very slight angle. In the case of the straightaway shot that is often presented I suppose that the best you can do is to hold your breath and aim for any part that you can hit. I saw a buck weighing 217 pounds shot dead by a bullet from a little "pop gun," that did not throw an expanding bullet, where the missile went the whole length of the body, coming out at the neck. It killed for the reason that it went straight up through the cavity of the vital organs.

About the unluckiest shot that a hunter can get into his game is the one located about where circle No. 6 is placed. This causes sure death, but only after several hours, and is a shot that is nothing short of a slow crucifixion for the animal. Then some hits that seem never to slacken the pace may come at No. 7, but pretty surely will cause death, perhaps after days or weeks, but in a place where the shooter can never get his meat. Any hit in the rear quarters of an animal is the mark of a mighty poor shooter and if only this kind of a hit can be scored the rifle had better never be shot.

A shot in the front quarters will invariably knock the game over if the right rifle is used, but will hardly ever do this when the animal is hit in the rear part. I think this is because the front parts are steering the remainder of the body and when these are thrown out of line the poise and balance of the bounding animal is destroyed. When the rear section of the speeding game is hit a powerful blow it fails to knock it down for the fact that this section of the animal is more the propeller or place where the power for the leaping stride is applied, while the front quarters constitute the rudder.

There are more considerations entering into the feat of making a successful shot at running game than those involved in solving a complex problem in calculus. Most important of all is a rifle that suits the shooter.

—*Bremmer*

STILL-HUNTING DEER

Still-hunting—the phrase itself—does not sound very interesting. But for the successful still-hunter, it has every thrill the hunter knows. That few practice it, or even become interested in it, does not argue so much against the style of the sport, as against the real skill of the hunter. There is a wide difference between man and dog pitting their combined efforts, and the lone hunter going into the natural haunts of his game and matching his skill, against the instinct and cunning of the wary buck.

Of course, still-hunting applies almost exclusively to deer hunting, as there is scarcely any other game animal or bird the pursuit of which permits of such a distinctive method of hunting. No doubt there is a blare of unusual excitement in pumping lead at a buck that has been routed out by a dog and is only hitting the "high places" in dodging dog and lead.

It is exciting—long odds against slim chance for a hit; quick aim against quick motion. It is the only method to follow where large parties go together. But there is another condition: the condition of a lone hunter, or two or three skilled hunters, who lack the help of a trained dog. I was forced to still hunting by a series of accidents that deprived me of my dogs. One was killed by a wounded buck and another by accidental poisoning. Up to that time I had thought that hunting without a dog was about as useless as trying to catch fish with a spoon.

Whenever I rode the range one dog was sure to be with me, and he missed no chance to rout out any deer that strayed near the trail. Of course I took my own chances

A remarkable close-up.

on getting a shot. All this time I was convinced that if it were not for the dog I could scarcely expect to see any of these deer. When I was deprived of dogs and forced to go it alone, I became strangely impressed with the number of deer I would see by the trail-side, or start at close range where I could choose my game with much more certainty than before. Then I began to find that by strolling around carelessly I frequently took deer entirely unawares, and could pick them off with comparative ease.

When starting on a hunt I would travel fast until I came to some locality where deer tracks were numerous, and then begin the slow manœuvering to outwit the game. If it were rough chaparral country, broken with rocky or grassy glades, I would often sit on one look-out position for a half hour or longer. And it is surprising how frequently at the end of a long wait a deer will stride leisurely into view. Or, stranger still, you will be attracted by the swaying, bobbing and jerking of a nice pair of antlers as some unsuspecting buck trims leisurely the top of a green bush, where he has been standing almost in plain view all the while.

But that is the waiting game. When the land is less broken and the brush covering more dense and uniform, then comes the real test of the still-hunter. He must choose the high timber and the right approach, and stalk into the brush to pit his skill against the native cunning and instinct of his prey. He cannot lumber in and take pot-luck. Every knoll or depression must be approached just right. There is seldom more than one direction at which a likely knoll or depression can be reached to give the hunter any chance for a shot. From any other angle, he will find only the fresh track, or hear the deer bounding away to safety.—Never approach from above; it is almost useless. Few deer will stand for inspection when they see an enemy towering above. The rare exception is when he feels securely hid, and risks discovery against the danger of escape. But once even suspecting discovery,

he will dash away in panicky flight and keep going until he is well out of harm's way.

By careful watching and listening one may possibly determine the approximate location of his first stop. It is sure to be at the top of some knoll where he can guard carefully against any approach along the trail by which he made his get-away; but the time consumed and the difficulty of a follow-up under such circumstances is seldom worth the try.

Curiosity

It is a deer's overweening curiosity that, in still-hunting, is most often his undoing. And it is the playing on this animal failing that determines the success or failure of the still-hunter. He must play it, too, at the psychological moment, else he will defeat his own best laid plans. This is why a long follow-up is seldom successful. The deer have too much time to suspect unusual conditions.

In still-hunting, the hunter must first of all look for tracks. If there are no tracks there are no deer, and a hunter's best art will be wasted on an empty wood.

One must be keyed up to the tense strain of this style of hunting, else he can not succeed. He must be absorbed in expectancy, and expectancy is best sustained by the unmistakable signs of the immediate presence of game. It is necessary to walk slowly, and as noiselessly as possible. At the critical moment each step must be guarded and calculated to avoid dry leaves and twigs. When it is impossible to avoid the accumulated leaves, then comes the strategy of imitation. It is not so difficult, either, for there is a striking similarity in the unguarded foot-step of a man and of a deer. A deer drops two feet with the clear-cut sound of one. There is none of the sweeping drag of the sheep; only the elastic rise and firm set of the foot, without slip or confusion of noise. This the hunter must imitate with a careful rise of the foot, and a firm set with a carefully measured beat. With this pre-

caution one may tread through considerable setting of leaves without attracting particular notice from deer although they may be close at hand.

The discordant splashing sound of a misstep or slip in the leaves, or the rasping of gravel under a sliding foot, will awaken and startle all animal life in the immediate vicinity and another move means defeat for the hunter. There is only one counter for such a mishap, and that is to stand perfectly still for half a minute or longer. If a deer is close by and has been startled but not stampeded by the unexpected commotion, he will be all on the alert for the approach of an enemy, but if there follows only dead silence his curiosity is immediately aroused. At the same time his fear is somewhat allayed.

He seems to expect of an enemy that he will keep up an uninterrupted pursuit and this sudden silence suggests that the noise is only the result of a tree-squirrel's mishap or, at worst, the approach of some careless wanderer. Although he hears the renewed approach, his allayed fears and added curiosity will often prompt him to give a long and thorough inspection to the visitor, and if the hunter is alive to his business it will furnish the opportunity he desires. Even if the deer dashes away before he is discovered, he will seldom run farther than the next ridge or prominent knoll, where he stops for a second look to see if he is pursued.

Following Up

This is the hunter's opportunity for a follow-up. He knows the location of the deer and he has the advantage of seeing the deer at least as soon as the deer can see him; any deer is bound to wait just a little bit longer than that, which is his undoing. This is the chance the still-hunter has labored probably hours to secure, and the rest depends on his aim. If he goes to camp empty-handed he can only offer lame excuses. He will never have a third opportunity.

It is a law, as inexorable as destiny, that no deer will stand for more than a second inspection. After that he is thoroughly satisfied and henceforth is only concerned for his safety. As against the still-hunter, the deer will always make good when the contest gets down to that simple basis.

In still-hunting the hunter must start at the foot of the mountain and climb upwards, or else make a careful survey of the proposed hunting ground and then work around from ridge to ridge, being careful to drop just below the series of prominent knolls. Around these the deer love to hover, and here they will fly as soon as disturbed. And on these lookouts they will ever pause—and unwittingly invite their doom.

No matter how skilled is the hunter in marksmanship, there are certain to be times when his best effort will result only in wounding the game, and then follows what may be a heart-breaking pursuit that tests to the limit the hunter's skill and his experience as a trailer. Each succeeding canyon or ridge is a field for strategy—the natural instinct for self-preservation pitted against the keenest wit of the hunter. No matter how much one may regret the loss of a fine buck, the true hunter cannot contemplate with equanimity the loss of a wounded deer. There is something sacred about his life and it amounts almost to sacrilege to have it wasted. The wounded deer is the great problem with the still-hunter, and yet even it fails in nothing of the all consuming interest. Every moment is one of tenseness and apprehension.

There is much misunderstanding about wounded wild animals. When that little white bead rests for a moment on your game and your finger presses the trigger there is a riot of noise; and if your game does not go down with the crack of the gun there is also a riot of action. The uninitiated who sees his wounded game tear away in headlong flight, spurred on by a frenzy of fear, thinks that half a mile will hardly abate the speed and that nothing

but death or utter exhaustion can terminate the race. The fact is quite different. It matters not how desperately wounded or how slightly, nor does it matter with what burst of speed he makes his get-away, the deer will seldom run far before he will stop as abruptly as he started and immediately lie down. This calls for the strategy of pursuit.

If you rush on, it will certainly avail you nothing. Bear this in mind: in front of you, quite probably under the first shelter, is your deer. Next: that deer expects instant pursuit and is alert to anticipate it. The longer he lies, the more absorbed he becomes in the pain. Moral: take your time. Wait for a time, in perfect silence. Then begin the follow-up. The deer will see you as soon as you see him; and you must see him as soon as he sees you. Then, if you are not too boisterous, there will ensue a moment of hesitation—just time enough for a shot. Your best chance is in that first follow-up; so be careful. It pays to measure every step and scan every foot of ground. It is only for a few yards and a few minutes, yet it may save hours of trailing and probably ultimate loss of game.

If by mischance you lose this first try, then there will be one more. From the first start, a wounded deer will run farther. The distance, of course, depends much on the character of the land; but surely he will accept some inviting spot to pause. But this time he may not lie down. That means that your second follow-up must be more careful than the first and it behooves you to make the most of it. For it is certainly your last chance to catch your game waiting.

Twice a deer will stop after being wounded and twice you may start him and not get him, but being followed to a second start is a warning that his instinct never fails to grasp. He no longer considers it an accidental encounter, that he warded off by that first escape. His instinct divines the relentless calculating pursuit—and he knows that his safety in is flight.

The four prong.

Then come all the tricks of deceit that Nature teaches to her defenseless brood. Limping or staggering on—never lying down, no matter how desperately wounded—he keeps always just ahead but never in sight. You trail and trail and trail. At last a wide canyon looms up and your hopes are high: surely he cannot clear that and make opposite side without being seen. You *know* he is just ahead. You have heard him perhaps, and now are carefully calculating to push him from the last dense thicket into the open canyon, or onto the sparse shelter of the opposite slope. But that deer has been calculating too. Already he has measured the width of the canyon and measured your distance behind him, and he plays safe. Painful as it may be, he has taken that canyon at high speed and is now panting on the brow of the opposite ridge.

Tracking

Slowly you follow, track by track and often retracing your steps to correct mistakes; always looking for that spot of blood to verify the trail. All the while somewhere on the opposite ridge the deer is waiting. At last you have made your way across and almost to the top; you will not see any deer; he has hidden himself in the thickest clump of brush he can find and he does not wait to see you. He is listening for your approach and at the first sound he is off. You may hear him and probably will. You dash for a vantage point to watch the next canyon. If you are lucky you may get him before he clears the next ridge, but the odds are against you. If to go directly across means dangerous exposure, he will run down or up the canyon until he can make a safe crossing. But from this time on he becomes less calculating.

He becomes more listless and plods on with a fatalist's indifference. Of course when you come suddenly close he will dash away with much noise and bluster, but he will make only a short run and may even stop in an

The siesta.

exposed position; or you may catch him standing on some sharp rise or prominent knoll, carelessly watching your approach. If you have been able to follow him to this stage, your chances are good; but you have had many an uncertain moment on the trail and only the greatest skill and keen sight has brought you through the maze of hundreds of other tracks, crossing to and fro or following the same general direction. The blood trail may disappear almost entirely, as blood congeals quickly under the kindly ministrations of Mother Nature; she has already begun first-aid treatment to her afflicted. You will be lucky if at a gulch crossing or on the trunk or limb of a fallen tree you find the tell-tale stain that gives you the much needed assurance that you are still on the right track.

Wounded Deer

There are several peculiarities of a wounded deer that help betray his track to the experienced trailer, but they are not always in evidence. For instance, a wounded deer will almost invariably run down hill, while the natural impulse of the well deer is to climb higher. When confronted with an obstacle, even a slight one, a wounded deer will always turn down, while a well one will clear it with a bound or turn upwards to avoid it. From a beaten trail a wounded deer will frequently turn at right angles to go straight down and then take up a path below. The one exception to the downward tendency is the supreme effort to baffle pursuit when a wounded buck realizes that his strength is rapidly failing. Seeming to gather all the nerve and muscle strength of his remaining vitality, he chooses some steep hill, and disregarding all trails, heads up through the thickest brush, directly for the top. It is a desperate effort, that records as plain as day the last chapter of his defense. On top of the hill you will find him exhausted, almost helpless; and only a bungling approach can force him to renewed flight.

To some, especially the uninitiated, all this may seem

to lack the dash and noise and thrill that is the soul of a hunting lure. But the nimrod who pits his skill against a wary trout's, to tempt him from the bottom of some deep pool, will not reckon the half-hour spent if at last the speckled beauty comes fluttering to his hand. That catch will be counted his day's achievement and prized above the score of others taken with easier casts. And every moment of his time is so tense and all-absorbing that no thought of health or home or office can ever shadow the spirits of a hunter who, unaided, pits his skill against wary game in its native haunts.

—*Bernard*

OUTFITTING FOR THE ROCKIES

The writer of the following notes lays no claim to authorship; it would be strange if he did, since his life from youth up to the half-century mark has been spent in hunting and trapping with neither time nor inclination to use a pen. Therefore, if he has failed to express himself *clearly to sportsmen readers, they will understand the reason why.*

To write of British Columbia as a whole—from a sporting point of view—would require a volume of matter in detail; in fact, it would be impossible, so vast are its half-explored solitudes of 395,000 square miles of territory, all of which offer more or less unlimited opportunities for the securing of big game trophies. I will therefore confine these notes to one particular district which, with the exception of the Cassiar and Pacific Coast, will cover the whole northern Rocky Mountain country.

The man who enters the Rockies for the first time in pursuit of its large and varied fauna will have entered a new world; and if he has been accustomed to hunting, broadly speaking, in the flat, forested, lake-besprinkled game sections of the East, it is strongly suggested here that he leave his experience at home—with his guide, as the conditions of terrain, fauna, mode of travel and hunting, equipment and guides, are entirely opposite. Outside of making a canoe trip down a fast mountain stream or on placid lake for the mere pleasure of canoeing, all game is explored for and shot on foot in the face of such natural obstacles as: Criss-crossed down timber on mountain sides, climbing over jagged masses of rock and through tangled

underbrush, up boulder-strewn ravines, across "loose shale and slide rock" at and above timber-line in a rarified atmosphere, that will be admitted, calls for physical soundness as a sine qua non.

On the other hand, it must be remembered that these natural obstacles are what has protected a magnificent head of game from many enemies of various kinds—including the ubiquitous Redman—down the long centuries to the present day, and will continue to protect them in the future from half-civilized whites, despite the make-belief, but don't-care—inefficient efforts of puny legislators.

All travel from and back to outfitting points is done in the saddle over rough pack and game trails, that lead up and through passes, across marshes, rapid creeks and swift rivers, and in some cases clean up to timber-line, where camp may be pitched in one of the many beautiful park meadows 7,000 feet above sea level. From this and other similar camps the modus operandi of exploring for and stalking the various species will be on foot, as, for example: From one to three thousand feet above camp for—Sheep and Goat; in the grassy basins, ravines and scrubby timber around camp for—Grizzly, Black Bear, Cougar, Mule Deer, (and in Sept.) Bull Moose; below camp in the heavy timber for—Wapiti; while still lower until the river bottoms are reached for—Virginian Deer, (and in Oct. and Nov.) Bull Moose again.

These nine varieties have their habitat in both Ranges running parallel with the Kootenay in the first 75 or 80 miles of its course, while the tenth—Caribou—has its habitat in the Selkirk Range which runs parallel with the Columbia River. These two rivers will be described later on.

A great lawyer once said that genius is simply perspiration. Probably; but the big game hunter who wants to become successful will have to tack on time and patience in front of the lawyer's simple remedy or go home empty-handed: These two simple rules, time and patience, if

closely observed from the moment the hunting grounds are reached until success is achieved, are worth all the perspiration that can be expended. The reason is obvious. Big game cannot be explored for and secured in a mountainous country on a time limit, no matter how abundant the game, or how experienced the guides; yet these two rules, so necessary to success, are entirely overlooked by nine out of every ten present-day hunters who visit the Rockies. Let us examine the trouble and apply the remedy further on.

The usual expeditions, being limited to time, extra men and horses must be employed to make up for this deficiency. Several varieties of big game are desired, the ranges of which are from 2 to 3 days' travel apart. Therefore the outfitter decides 16 pack and saddle horses with 5 men, viz.: 2 guides, scout, horse-wrangler and cook, will be none too much to handle two sportsmen and their duffle camp equipment, supplies, etc., for 10 or 12 days. The horses must be packed lighter than usual if fast trips of from 25 to 30 miles per day are to be maintained over trails with a dozen natural obstacles to continually hold them up until removed or surmounted.

Every camp ground, where abundant feed for 16 horses can be obtained, must be thought out ahead, and once this camp is decided on it must be reached at all costs.

Horses

The horses used for mountain work are hardy, sure-footed little cayuses, capable of packing 175 to 200 pounds over steep and dangerous trails day in and out for weeks on green food, if given time.

Even then they often come to grief. But for fast travel 125 pounds will be sufficient for each horse. This must be sorted out and packed into 50-pound bales—one on each side of the pack-saddle—with some 25 pounds of cooking utensils, axes, rods, guns and other long or awkward stuff, on top. This must be carefully adjusted on the saddle

The mule deer fawn, all ears and eyes.

and diamond hitch properly "thrown" or it will work loose continually. Time must be made to save time: But those sportsmen who have been accustomed to packing roughly for canoe expeditions back East fume and fret at the valuable time they think is being lost. The guides know better and are adamant: With them one ounce of experience is worth a ton of theory. They have a clear recollection of some *subsequent* trip where a badly packed or adjusted load had slipped to one side, or a saddle with a man astride it had worked back too far, on a steep piece of trail, a wild plunge to recover footing or balance on a narrow trail and a moment later a shapeless mass of man, or horse, or both is lying—a thousand feet below: Generally it is their own personal duffille that is the hardest to "make up" for either fast or slow trips, as it consists of stuff that was never intended for the western mountains, such as patent mosquito tents of peculiar construction, with special flooring, stoves and pipes, pneumatic beds and heavy pumps to blow them up, all of which is made to roll up together and fit in waterproof bags some 3½ or 4 feet in length and weighing 125 to 150 pounds. In the center of this roll for safety is stuffed all kinds of heavy useless articles, with a 12-foot trout rod in 3 pieces, to finish off. Handy bales doubtless for canoe work and man power on the portages back East but for fast mountain travel—? Some picturesque language escape the men on being told that it must not be unpacked, but go as it is: From that moment the expedition is doomed to failure —so far as trophies are concerned: Guides no longer think of hunting or trophies, but how they are going to get through as everything has been planned and thought out days ahead for camping grounds on the best game ranges—here for Moose, Goat and Bear, over there for Sheep, Wapiti and a chance for a Grizzly, further on for some good fishing in a lake that lies in the center of a splendid all-around game section, all of which are from 2 to 3 days' travel apart, must now be thrown aside at

the last minute and fresh arrangements made for closer camps and different hunting grounds.

The two strongest and stoutest Dobbins are selected from amongst the 16 horses, and the trouble begins. The bags won't lie along the horses' sides, they are too long, one bag alone cannot be thrown across the saddle, it would be top-heavy, there is only one way—straddle two together on the saddle like a man. Each horse is now carrying, roughly, 250 pounds of *dead* weight, which is equal to 400 pounds of *live* weight, over timber-strewn, narrow, stiff mountain trails; sticking out at the sides and high above the saddle, the bags catch on every obstruction that the other horses pass with ease. Axes, and not rifles, are the main tools required on this trip, here a jutting rock disputes the right-of-way—on a dangerous corner, there a network of trees must be cleared out of the way, or a fallen tree over the trail stops both horses dead, more axe work.

The bags and their contents are coming in for some pretty rough treatment, rest assured; so are the horses, both are smashed and staggered often and equally as well as doused in deep creeks and back channels, or swept away in rapid rivers. And the men? Are out of patience, sullen and bad tempered—not from the hard and unnecessary work—no! but because they can see twelve, or the extreme limit allowed, fifteen days, slipping away without a head of game being seen or a shot fired; for this the guides' reputations must and will suffer, and all through 500 pounds of luxurious but useless dunnage that should never have been brought on a time limited hunting trip in the Rockies! But transporting it, as outlined above, is not the only trouble.

To continually pack up and unpack, pitch and break up camp with this dunnage, takes hours instead of minutes—so many shifts being made—that midday is the only time left to hunt, with the result expected—failure: Time is the secret of successful big game hunting, and all that

money can do or employ is useless without it. Neither pleasure nor profit is derived from these outings, only disappointment and useless expense all-around. And the cost for the above outfit of men and horses will have been nearly $1,000.

In the foregoing the reader will have noted why the expedition failed—not from the luxurious impedimenta—but from the want of time. In other words, the larger the outfit of men, horses and awkward baggage, the more time is required to be successful. To have, for instance, secured the trophies desired by this expedition, from forty-five to fifty days—and not fifteen—was absolutely necessary. The same expedition—without the aforesaid baggage—would only have required about thirty days—of course, speaking broadly. But the man who is willing to leave all superfluous dunnage behind, strip down to his guide's weight, live as he does in a common tent, with ordinary blankets and balsam boughs for a bed, and a cheerful campfire, wherever night finds them, using a base camp from which to make side trips to the various game ranges, will in less time and at one-fourth the outlay see and kill more varieties of big game than the biggest expeditions, outfitted regardless of cost, that ever visited the Rocky Mountains.

To work from a base camp cuts down the working expenses, as less men and horses are required for a side trip of, say, from three to seven days, as only sufficient camp equipment and supplies are required for that length of time. The E. Kootenay alone of all other districts I am acquainted with, lends itself to this particular system, as it represents a cart-wheel, the base camp being the hub, while the radiating spokes are trails leading to the four points of the compass; the wheel having a circumference of seventy miles within which all nine varieties have their habitat. The tenth (Caribou) being some ten miles outside this circle to the Westward, requires a side trip of from twelve to fourteen days. Here, then, sportsmen of

A hungry bear and a colony of ants in sight.

all calibers may suit themselves as to expense, providing always that sufficient time is allowed in all cases.

The Northern spoke of the wheel leads to the Moose range; the Southern to Bighorn (Ovis montana); the Western to Moose and Sheep; the Eastern to Wapiti and Sheep; while Goat, Bear, Cougar, Mule and White-tail Deer will be found more or less all over on the same ranges.

Rates

The usual rates per day are as follows: Guides, $5; Cooks, $3.50; Horses, $1.00 for first two weeks. Board, $1.00. Tents and other camp stuff from 50c. to $1.00, as wear and tear are enormous. Sportsmen, either alone or two together, have here a wide field as to expense to choose from, ranging (roughly) from $10 to $15 per day for one, and from $17.50 to $25, or more, per day for two. The month of September, generally speaking, is inclined to be damp with snow in the higher ranges. About the 20th a slight flurry of snow may be expected, which (unfortunately) disappears in the lower ranges within 48 hours. Otherwise the days are warm in the valleys and on side hills, and cool at nights. All game is at and around timber-line, including bull Moose. This rough-hewn and ungainly looking beast likes to be alone apparently until his antlers are clear of velvet, as until they are he is peevish, irritable and fully on his guard, hiding away all day in the scrub and jack-pine thickets just under timber-line. By the middle of the month or so he is in fighting trim and drops down to accept a challenge—ploughing up deep furrows in his haste—or to hunt up his harem, for the mating season is at hand.

October and first two weeks of November are ideal months in which to enjoy a hunting trip from every point of view. Rainy weather has gone, to be replaced by clear, crisp, sunny days that resemble the Indian Summer of the East—for the first three weeks of October—at all events. A snow-storm may, or may not, sweep across mountain

and valley towards the end of the month. If it does it will lie on the higher ranges and drive the game down to a slightly lower elevation—if we except the old Billys and Rams who are not to be intimated by a handful of snow, so defy all comers—the former clinging all day to the face of his favorite cliff like a fly on a window-pane, while the gallant Bighorn still stays out in the open meadows and tarns, trusting to his marvellous keen sight to guard him from all danger, until the heavy snows of mid-winter force both down to seek food and shelter with the ewes and lambs in the thick timber.

By the middle of November sufficient snow will have fallen in the valleys and on side hills to clearly show the spoor of all game, and to those who are not afraid of a little cold, is the most successful time to hunt, though a bit more expensive as grain must be carried along for the horses.

Personal Outfits

Regarding personal outfit, very little is wanted, though each sportsman will, of course, please himself. Personally I take the following: 2 suits of flannel under-clothing, with half a dozen pair of woolen socks; 2 suits of over-clothing of soft warm material, brown or khaki color preferred; pair of heavy waterproof boots or shoes, nailed with lumbermen's "calks" to prevent slipping on logs, side hills or loose rock and shale; pair of light rubber shoes which are splendid for climbing and catching a grip above timber-line in dry weather, and stags for camp use. Also a riding raincoat to strap on saddle. For carrying while out hunting, a light pull-over raincoat, warm jacket or sweater to slip on if called on to sit or stand about after getting warmed up, powerful pair of glasses with wide field, camera, hunting knife and rifle, is sufficient. To take more than this is not only useless but seriously hampers your guide, who is already carrying his own or your spare rifle, lunch, packing ropes, etc. Remember the success or failure of the trip expends on his experience of

woodcraft and a knowledge of the habits of all game. Don't hamper him. Heavy side arms with belt of ammunition is only an incumbrance to impede progress. If you can't stop a charging grizzly with a reliable rifle, you certainly can't with a six-shooter! Moreover, quietness in camp is a *sine qua non* when near the haunts of all game, especially Bighorn, therefore shooting with any kind of arm should never be indulged in. Guides carry on the saddle their own axes, which must be heavy enough to cut out dead and standing timber found in the way on a trail, or for camp use. Bring your own blankets or sleeping bag, if you prefer it, with the dunnage outlined above, outfitters will find all other camp equipment.

Rifles

As for the best type of rifle for all-round work is the Rockies, each sportsman will have his own opinion despite anything that can be said herein to the contrary. My experience is that the latest type of military rifle (built for sporting use) gives the best results on all varieties of big game found in the Rockies—when a second and heavier rifle is not carried by the sportsman's guide—such as perfect accuracy at all ranges, low trajectory and smashing power. These three combined are absolutely necessary. In the higher altitudes Sheep, Goat, Cougar or Mule Deer, offer shots, as a rule, at long range under atmospheric conditions that puzzle and deceive—high winds, never steady in one point for a minute, that drive the dust in swirling clouds. Again mists float up, down or across, obscuring everything from view, to be swept aside in a few minutes as though by an unseen hand, or a snowstorm sweeps and rages for 20 minutes, leaving a white blanket behind, and all this in a highly rarified atmosphere that is very deceptive at all times to judge distance correctly. Here accuracy and low trajectory up to four or five hundred yards is the proper weapon. On the other hand, smashing power is wanted—and badly wanted!—should a grizzly, moose or wapiti suddenly come into view

A sniff of fresh venison.

at varying ranges in the great park-like basins, or among scrubby timber and underbrush at head of ravines or side hills, through which you will pass on the way from camp to sheep and goat ranges.

In September the former in his many-colored coats—cinamon, dark silver-tipped, or brownish with gray-white tips, from which the Grizzly takes its name—may be met with in the above-mentioned places in search of the last to ripen berries, for which they have to roam over considerable ground, or ripping up ground-squirrel burrows by the square yard, to say nothing about turning over half-ton rocks in search of ant-eggs, to the danger of all and sundry a thousand feet below! On coming suddenly upon this first-class, hefty burglar at close quarters, he will decide on one of two things remarkably quick—either to leave in a hurry, or fight without any talk, especially if a mother with cubs. If the former, you want some sort of a shooting tool that smashes up things when it hits; if the latter, and you are not married or in debt, you will have to play the MAN. Don't look round for the proverbial tree that is easy to climb; it ain't there, it never is and would be of no use if it was, as in doing a 100-yard sprint in the usual 10 seconds this clumsy looking thief can give away points and win in that distance. Stand perfectly still, keep your head and nerve and shoot for the two most vital points, head and neck. Should a chest shot offer—as it will if charging up hill—don't take it! A grizzly has enormous vitality and, although its heart and lungs may be shot to pieces, it will still live long enough to tear a couple of men up pretty badly. Remember a bear's weakest point is its eyes, its strongest, ears and nose, therefore to run is only to make matters worse. If the bear is below you break the backbone over the kidneys—this is a fatal shot.

Furthermore, a long-barreled rifle is very awkward in thick timber or underbrush, to say nothing of climbing up steep mountain sides, etc. Every inch in length and ounce

in weight counts up rapidly in packing by horse, or carrying all day in such terrain as outlined. The same applies to fishing rods. A rod should be in 3 pieces, otherwise it stands a good chance of being smashed up. Even then it should be well protected whether carried on riding or pack-saddle.

The two main rivers in this district are the Kootenay and Columbia. Curiously enough, the former heads in the North end on the Western slopes of the Main Range of the Rockies and runs South, while the latter heads in the South end on the Eastern slopes of the lofty Selkirk and runs North, a single range dividing them for over 100 miles as the crow flies, when the Kootenay cuts through this range and passes within a short canoe portage of the head waters of the Columbia River. Thus forming the letter U or horseshoe curve, and consequently make possible a magnificent canoe trip down both rivers of—approximately—250 miles. The Kootenay rises 20 miles south of Leanchoil, a small station on the main line of the Canadian Pacific Railway, the Columbia runs back to Golden, also on the main line of the same railway, the two stations being only 30 miles apart.

The upper reaches of the Kootenay are shallow, narrow and winding, but fairly fast over gravel bed for the first 50 miles or so, becoming broader, deeper and faster as several large tributaries empty into it, when it becomes a powerful river, with stretches of "white-water" that require careful navigation, as it is running at from ten to twelve miles per hour. The Columbia, on the other hand, is deep and quiet, the first forty miles being a series of very beautiful lakes the other eighty miles to Golden being deep, sluggish and slow through wild-fowl marshes.

This canoe trip offers several possibilities combined. Briefly, the Kootenay runs through a big game and fishing territory in the heart of the Rockies, from which side trips may be made up its many tributaries and feeders; while the Columbia offers on lake and river splendid wild-fowl

shooting, including also side trips into the Selkirks for Caribou, Goat and Grizzly. As a Range for the hunting of this latter animal the Selkirks cannot be approached by any other on this continent.

This brings me to remark that the Spring months (May and June) are the only months in the year when Bear may be hunted with every assurance of success. Bears are great roamers, not from choice, but from necessity throughout the summer and fall months, as during these months their food is widely scattered from valley to timber-line, whereas in the spring months they are confined to a narrow compass on the "slides" from which low down the snow first disappears and the earliest green food appears. A two weeks' trip at this time is worth two months in the fall, being free of all exertion with a possible certainty of from two to half a dozen bear. Their peltage at this time is in prime condition.

Guides

And the guides: This is a question of moment as on them depends the success or failure of a big game hunting trip. This will be acknowledged by all readers, as well as the fact that the qualifications called for in the guides of the East and West are as far apart as—their respective territories. Although perfectly familiar with both and their work, I have neither the intention nor space herewith to go into details on the respective merits of either, except to say that a first-class Rocky Mountain guide is as hard to find as the proverbial hen's tooth; outside of the still unsettled North—where the redman yet leads the primitive life of his forebears—his brother of the South has lost, the younger generation in particular, those habits and instincts so necessary in a good guide from his contact with a none too enlightened civilization. Though partially civilized, he is still wholly savage in his intense hatred of the white-man, whom he looks upon as an interloper and destroyer of his great game, therefore unreliable as a guide, demands the highest wage and gives very

The mountain pack train.

little service in return, prone to laziness at all times and useless in camp without his squaw. On the other hand, he is always silent, knowing how to keep his tongue under control in or out of camp. It is the creed of many writers that the eyesight of the redman is keener than that of the white. I believe this to be a mistake; the Indian's eye is trained, he knows what to look for, and is looking for it, something foreign to and of a different shape, appearance and color to its surroundings. The average white man who takes an Indian with him does not know what color or place to look for the various animals in the open season, so relies on his Indian's eyes. A working knowledge of natural history, however, is required if one is to rely on one's own eyes, and this must be acquired by practical experience in the field, as it is impossible upon paper to teach any man to become a successful big game hunter. The best guides obtainable are those little concerns who make a specialty of the work, trapping in the winter, guiding in the Fall and Spring, and looking up fresh hunting and trapping grounds in the Summer months. Unfortunately, this class of men are fast dying out through being snowed under by great Limited Liability Companies who pay dividends annually, but fail to satisfy their patrons in the majority of cases, for the reason that they cannot supply first-class guides *wholesale*—as they are not available!

There are only three ways in which intending sporstmen can get in touch with reliable men of this class—(1) through the recommendations of bona fide sportsmen who have hunted in the Rockies, (2) through leading magazines like *Forest and Stream,* and (3) through the sporting departments of the great Trans-Continental Railways, like, for instance, the Canadian Pacific or the Canadian National, who keep in close touch with the best men clear across the Continent.

—*Ubique.*

SKINNING HEADS OF BIG GAME

The mounting of a head depends to a great extent on the manner in which it is handled after the animal has been shot. In this connection it might be well to mention that the two principal points to guard against are decay and a reckless handling of the skinning-knife. Patience and care go a long way in skinning out a head properly. A thorough and liberal application of salt as a preservative will do the rest.

The most persistent defects in badly-handled heads are caused first in bleeding the animals by making an ugly gash on the throat, and later on, in the process of skinning, by cutting the eyelids. In bleeding, the throat should not be cut. Instead an incision should be made under the front leg and behind the third rib. The heart lies close to this point and a thrust here (if bleeding is necessary) will do all that is required. The old method of opening deer heads on the throat instead of the back of the neck is fortunately not followed much now.

Occasionally, however, a head skin comes to hand carelessly ripped off, with a slit up the front of the neck, badly-cut eyelids, and often decayed beyond repair. All these defects not only tax the ability of the taxidermist to conceal them, but cause an extra amount of labor, the results of which quite often fail to make the mount equal to a perfectly prepared trophy.

Many sportsmen are apt to overlook the importance of devoting personal care and supervision when preserving their kill, and too often the hunter considers that, having shot his game, his work is over—the skinning and other details being usually delegated to the guide who is always full of assurance on such matters, but often sadly lacking in the knowledge that this work demands.

It is not inferred that all guides are hopelessly irresponsible in this respect. Many of them are wonderfully proficient; but, judging from the great numbers of care-

lessly handled skins that are received each year by taxidermists, it would seem as though it would be good policy for the sportsman to keep an eagle eye on this preliminary work. Even a moderate amount of labor and a little directing here and there may be the means of saving a prize head.

When an animal has been secured, and is ready for operations, it can be skinned best just where it falls, providing the location is dry and the ground level. The skinning of the head and neck should proceed first. The body may be skinned out after the opening cuts have been made on the neck and shoulders.

To skin a deer head proceed as follows: (The same methods apply to all horned animals of North America.)

Begin by making the opening cut on top of the shoulder; continue this incision until it completely encircles the neck. The next incision starts at a point directly between the horns and preferably three inches nearer the base or rear of the skull. (Fig. 1.) In order to make a straight, continuous cut from this point to the opening on top of the shoulders it is advisable to place the animal on its belly with neck outstretched, and the front and hind legs bent and propped under the body to brace it. The actual skinning may now proceed by cutting and pulling the ends where the two opening cuts meet at the high point on the shoulder.

In cutting the fine white membrane which joins the hide to the fleshy part of the neck the skin should peel off quite easily; care must be taken, however, not to try to see how fast it may be done until expertness is first acquired; the danger of making holes will thus be reduced to a minimum.

Before skinning or cutting off the cartilaginous base of the inside of the ear the skin on the throat should be worked down towards the underjaw. Next grasp the ear firmly and, pulling the skin over it, sever the cartilage close to the skull. (Fig. 2.) By pulling smartly on the

Fig. 1.

base of the ear the skinning will proceed more easily. The burr or base of the horn offers some resistance. Bring the knife into play here by cutting up towards where the hair growth commences on the base of the horn; encircle the base by cutting down to the bone; then by pulling on the skin quite hard the knife cuts will become much more effective, releasing the skin from the tough fiber which holds it to the horns.

Now insert the left forefinger under the eyelid from the outside and into the orbit (Fig. 3); skin carefully down towards the finger—the explanation being that the finger will give due notice in the event that the knife cuts come too near the eyelid. The finger also serves as a means of pulling on the eyelid, thus assisting the operation of skinning around this part. All around the eye the knife should be made to cut close to the bone; *otherwise the eyelids will be cut.* The gland directly in front of the eye, sometimes called the "tear," is a deep cavity, and here the point of the knife should be shortened in the hand and kept close down upon the bone. This part has sometimes to be actually gouged out, as it sticks very tightly to the skull.

Proceed in like manner with the ear and eye on the opposite side. It will then be easier to skin down the nose and throat.

When the skin has been pulled over the nose about half way between the eye socket and the extremity, a straight vertical cut should be made down to a point where the teeth or rear molars are set (Fig. 4). Then by inserting the left hand here, the severing of the inside skin on the lips will proceed more easily, with less danger of making ugly gashes on the mouth; moreover the opening shows clearly that the skin is not being mutilated.

The nostrils must be cut down to the bone but well back from the end of the nose, on a deer about two inches or less in front of the nasal bone (Fig. 4). By

Fig. 2.

Fig. 3.

Fig. 4.

a stiff pull on the skin here and there, the skinning will proceed more readily and the nose can be finally severed from the skull at the end. The under jaw should be skinned right out to the gums at the base of the teeth.

After the entire mask has been removed, the preserving should begin at once by removing all superfluous flesh on the neck and the thick, heavy meat around the base of the ears and eyes.

The nose needs further skinning. The cartilage must be opened up, and any meat or muscle over one-quarter of an inch thick must be criss-crossed with the knife to enable the salt to penetrate properly.

The skin on the lips being double it must be opened up along the inside and laid out flat so the salt will have full action. On such a large-nosed beast as the moose it is most essential to clean and skin out this cartilage or gristle; failing to do so may mean a spoiled head. The eyebrows and the loose flesh clinging around the eye should be pared down a little also.

To properly preserve the ear, it should be skinned out to the tip. To accomplish this, however, requires a deft hand. Many skins are received in good condition with the ear only partly skinned, the remainder drying out after being soaked in the brine accumulating on the inside of the hide. However, by inserting a stick in the ear it may then be skinned quite out to the tip. Care must be taken not to push a hole in it or tear it during this delicate operation. Turning it back from time to time will indicate the way in which the skinning may proceed. Using the fingers to push rather than pull is an advantage.

Any blood adhering to a skin may stain the hair if left on too long. This is especially true with white sheep and mountain goats; they should be washed free of all blood as soon as possible and preferably before the first salting.

The cutting, paring and skinning having been accom-

A hide worth preserving.

plished, the next operation is to apply a liberal quantity of fine salt and see that it is well rubbed in. For a head the size of a deer's three pounds should be ample; what is left over may be salted properly. Every inch of the headskin, including the inside of the ears, should be well rubbed with salt. No alum should be applied to skins which are intended for mounting, as it shrinks them to such an extent that they lose most of their elasticity.

Hang all skins up in a cool, dry place away from prowling animals or vermin, such as rats.

A word about shipping and packing may not be amiss. A box for skins is always preferable to a crate or bag. Delays in shipping and the consequent storing of skins in rat-infested warehouses is always a risk to be guarded against.

A box with seams or openings not over an ich wide where air may circulate, is the most satisfactory.

In shipping it is well to make sure that specimens start moving toward their destination at once.

FIELD GUNS

The sportsman about to purchase a new gun usually has opinions of his own as to who the maker shall be or is guided by the advice of friends in whose judgment he has confidence; fortunately, he will not go wrong on any one of the four or five leading American manufacturers. The dimensions of the weapon which he selects, that is, the length of barrels, and stock, drop weight and other dimensions, will depend upon his strength and other physical peculiarities, as well as the purpose for which the gun is to be used. A question, however, he will have to consider carefully is, shall it be bored cylinder, improved cylinder, modified choke, or full choke? The discovery of choke boring has played a most important part in the development of the shot gun. After it was ascertained that a construction of the muzzle would hold the shot together and increase the range and pattern of the weapon there was an extraordinary craze for close shooting guns. Sportsmen insisted upon the heaviest choking and the gun makers vie with each other in their production. These men soon discovered, however, that in upland shooting with excessively choked guns, they missed many shots or uselessly macerated the game. This led to careful experimenting, but it was years before many sportsmen awoke to the fact that the full choked gun was a handicap in most forms of field work and for the game field the cylinder gun was to be preferred. As a result many sportsmen discarded their choke bores and turned again to the cylinders.

In those sections that are heavily shot over, where game is wild and rises at long distances, the cylinder bore frequently fails where the choke bored gun would have

reached the birds. The constant aim of manufacturers of guns, however, has always been to obtain a regularity in preference to extreme closeness of pattern. The eminent authority, Henry Sharp, in a recent issue of the British Sportsman, in reply to an inquiry on this subject, says: This opens a wide vista—one, perhaps, too often overlooked when the question of choke-boring comes under the sportsman's consideration. To many individuals "choke" means a full measure of bore constriction and nothing else; on this basis choke for game-shooting is very often condemned in toto. From conversations that I have had with shooters here or there, the belief has assumed shape that some proportion of the shooting public appears to be unaware that the term choke covers an exceedingly wide range of bore contraction. Guns bored on the cylinder plan are thought to throw their shot in a "free and easy" style which greatly conduces to the maintenance of "good" shooting and the filling of the game-bag; on the other side of this mental picture stands the choke, and it is not favored because of the assumption that a more or less bullet-like clustering of the shot pellets attends its use. In other words, the cylinder is thought to produce ordinary, every-day shooting, with which all sportsmen have been familiar from the earliest ages of sporting firearms; whilst the choke is deemed only suitable for use in the hands of the most capable rifle-shot, and then only at extraordinary ranges, lest it reduce the flesh of game to the consistency of potted meat. Probably this will be deemed an exaggerated summing-up of the views sometimes expressed respecting the utility of the two forms of barrel-boring known as true cylinder and full choke. For certain forms of game shooting 75% of choke is unsuitable but it is illogical on that account to condemn all degrees of choke. I think it true to say that the estimate of choke formed in many quarters is altogether erroneous, and, therefcre, misleading—indeed, some men I have met appear altogether to ignore or are unaware of the fact

that there are various degrees of choke; they have never stopped to inquire; so with them cylinder is cylinder and choke is choke; the first is the best possible, and the other is more or less an unmixed evil.

Choke Boring

I may be asked why it is that I cannot countenance the true cylinder, so will say that the primary, the middle, and the final cause of my complaint in respect of this form of barrel-boring arises from its total lack of ability to effect a true delivery of the shot charge with any degree of continuity. I have witnessed the shooting of true cylinders under the most favorable conditions conceivable; the loading of the cartridges has been conducted under rigid laboratory conditions—to be more precise, the cartridge cases and wads were sized and selected by the finest micrometer measurements; powder and shot charges weighed to half a grain, and the pressure on the wads and the turnover of the case being effected with similar mathematical accuracy. Despite all this care, 10, 15, or perhaps 20 per cent. of the shots fired produced an unaccountable scattering of the pellets. As I have previously remarked, it is this altogether inexcusable habit of the true cylinder which leads to its condemnation at my hands. Guns which give such fatal evidences of total incompetence towards shot control are not arms that I care to use in the field, for the simple reason that one never can form a reasonable forecast as to the result of any shot taken with them at any object—sitting or flying—no matter how good the aim may be. No man can do justice to himself with guns that perform in that manner, for, although one shot may produce a shot delivery as perfect as heart can desire, there will then possibly follow discharges which are never certain to hit the bird aimed at, but, nevertheless, are quite capable of wounding others towards which those errant pellets were not consciously directed.

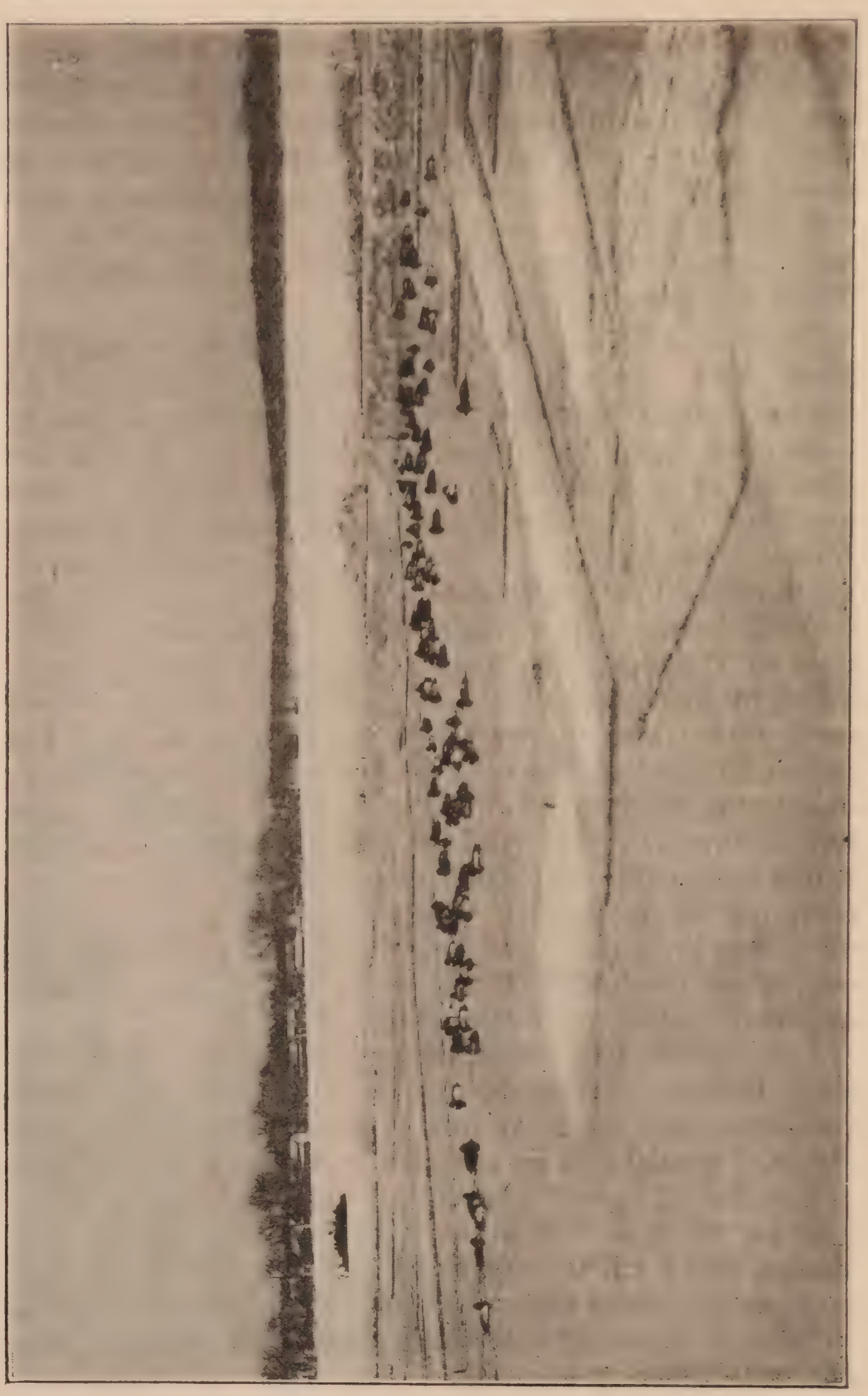
This being the apparently irremediable position with

regard to the shooting of the true cylinder, I have always regarded choke as one of the most valuable improvements ever effected in the shot-gun. Gunmakers of discernment readily seized upon this highly advantageous method of shot-gun barrel-boring upon its inception, and why anyone should still have doubts respecting the relative standing of true cylinders and guns having some degree of choke, I can not understand.

True, it is sometimes possible to have too much of a good thing: there is choke and choke, and to use a 75 per cent. choke for shooting quail or for prairie chicken in September, may be altogether inadvisable. But is the choking of gun-barrels to receive condemnation on that account? It is merely a question of degree in choking; forms of choke can be devised to suit every phase of sport encountered in this or any other country. In the case of the shooting above mentioned it is merely a question of the degree of choking selected; probably with standard loading—and 1 1-16 oz. No. 7 shot—a 50 per cent. choke—that is, one producing patterns of some 140 pellets on a 30 in. circle at 40 yds.—would prove admirable in the hands of 90 out of every hundred men engaged in this form of sport. And the vastly important advantage conferred by this very slight degree of barrel constriction must not be overlooked, which is that in guns so bored on proper lines the "blow-away" shots, so common in the case of the true cylinder, will prove to have been virtually eliminated when good ammunition is used.

In these times of reduced shot loads choke has become more than ever valuable, for, with 12-gauge shot loads reduced to one ounce or less, it becomes more than ever essential to maintain an effective control over the delivery of the shot. True cylinder boring altogether fails to maintain an efficient control over the delivery of its shot charge, and I fail to understand why any cartridge manufacturer or powder maker will for a single moment tolerate a form of barrel-boring which gives such highly erratic and unsatisfactory shooting.

—*Bruette*



Blocks on the ice.

Barrel Lengths

Gun-makers and sportsmen are an extraordinarily conservative body of people. It was only by the slowest stages and the most gradual steps that the flint lock was eventually perfected and a long period ensued before it was finally displaced by the percussion lock, and later the breech loading principle was adopted only after the greatest deliberation and the severest tests had been made.

The conservatism displayed in relation to the various changes in the methods of loading and igniting weapons is quite apparent today in a blind acceptance of certain fixed calibres and an arbitrary length of barrels for all guns, for today sportsmen and gun-makers cling closely to adages and principles that were laid down in the days of black powder. To begin with, it may be mentioned that the black powder which was in use in the days of the flint lock, the muzzle loader, and in the early days of the breech loader, was a chemical mixture of slow ignition and it required barrels three or four feet long to develop its full energy.

The modern smokeless powder which has been in use for a quarter of a century and more has been brought to a very high degree of perfection. It develops its power quickly and a barrel fifteen to twenty inches long is all that is required to insure its full ignition, consequently any excessive barrel length through which the shot is forced to travel simply retards its velocity. To be sure, this is so slight as not to be appreciable in itself, but it immediately develops new possibilities for the gun-fitter. It enables a man to use a gun with barrels of the length which he can handle with the greatest facility. He is no longer confined to certain limitations. Just why a 12-gauge gun barrel should be 30 inches long has never been satisfactorily explained. It is perfectly apparent that a man 5 feet 4 inches tall of moderate strength, and short arms, cannot handle with the greatest facility a weapon pre-eminently adapted to a long-armed man 6 feet 2 inches

tall, of heavier build and more powerful physique. The gun-fitter, however, as a rule, fits both of these men with weapons with the same barrel length. It is not the proper thing to do theoretically and the theory has been proven correct by scientific tests and practical experience in the field.

Sometime ago Mr. Winans, who has perfected many ingenious devices, called the attention of experts in gunnery to certain results attained in shooting 22-calibre rifles at a cinema. The misses with these rifles were all in front of the birds. In shooting with shot guns the misses were behind the birds. Mr. Winans further confirmed these results when taking running shots at deer or wild boar with the rifle just as clearly as when taking crossing shots at pheasants, grouse, and other game with a shot gun. The solution that he arrived at was that the velocities recorded for the shotgun were roughly half of those attained by the rifle, therefore, the shotgun fell behind. This solution, so far as it goes, is undoubtedly logical and correct, but the fact must not be overlooked that Mr. Winans' rifle barrels were from four to six inches shorter than the barrels of his shotgun. This enabled him to swing on moving objects more quickly with the rifle than with the shotgun as the muzzles of the rifles would have to do a less amount of traveling than the muzzles of the shotgun.

It is very well understood that a gun with short barrels can be swung much more rapidly than one with longer tubes. In fact, barrel lengths play a very important part in the speed of swinging a gun either to the right or the left in the field or at the traps, and few birds are lost through aiming too far ahead. The misses usually are the result of shooting behind; in other words, insufficient lead. It, therefore, follows that anything that will quicken up the swing and increase the lead will improve the score, particularly on crossing shots. There is no surer way of speeding up a shooter than to shorten the length of his barrel and this will apply particularly to men of mod-

erate strength with short arms. It is impossible for men of this type to handle speedily weapons that are more suitable for powerful, longer limbed men. A man accustomed to barrels, 30 or 32 inches long, will not at first feel at ease with a 26 or 28-inch weapon. This feeling, however, will soon disappear and in this connection it may be also mentioned that nothing will true up a man's line of sight more accurately, give him greater confidence or reconcile him more completely to the use of shorter barrels, than to have them equipped with the large ivory sights that are sold by the Lyman and the Marble people.

Thirty inches has come to be recognized as the standard barrel length for 12-bore guns, but this length is entirely arbitrary. It dates from the days of black powder and it does not apply to modern weapons using smokeless powders. Therefore, the sportsman who is shooting behind his birds either in the field or at the trap can dispense with two, three or four inches of barrel length with the result that he will handle his new weapon much more smartly and rapidly without suffering in any way from loss of pattern or penetration. Ten years ago there was a very strong disposition towards trap guns with 32 and 34-inch barrels. This has gradually moderated, while in the field 12-bore guns of 28-inch barrel are more frequently seen.

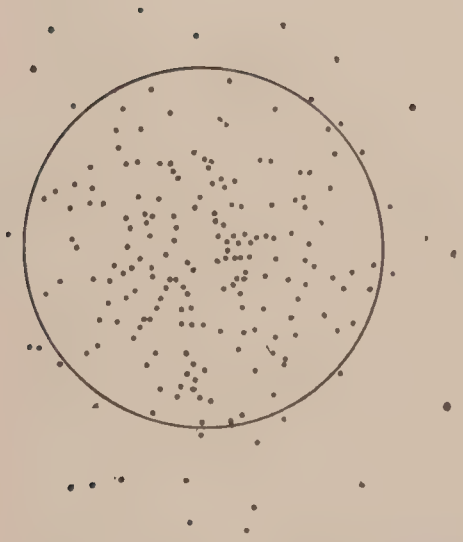
—W. A. Bruette.

SHOTGUN LOADS

While looking over and analyzing a series of tests of various shotgun systems of boring and shell-loading that have been recently conducted at the FOREST AND STREAM Shooting Schol at Tenafly, New Jersey, and comparing them with the tests that were conducted by this paper nearly forty years ago, one cannot fail to be impressed by the constant tendency, both then and now, towards the overloading of shotguns of all gauges.

It is comparatively easy to understand how such extremes were reached and such abnormal loads developed in the good old days of black powder, for then everything was conducted on a rule of thumb basis and one man's opinion was quite as good as another's, for powders were not thoroughly standardized and the muzzle loading guns encouraged the greatest latitude of opinion and enabled each man to experiment to his heart's content, but today the possibilities of all of the better known powders are well understood and the boring of guns has been standardized to a remarkable degree and we have accurate instruments for determining the possibilities of various combinations of powder and shot. It, therefore, seems strange indeed that practical sportsmen who desire to improve their shooting in the field do not experiment with the various combinations and determine accurately the load of powder and shot that is particularly adapted to their favorite gun and their own peculiarities. In fact, the peculiarities of the individual is the most important unit in the equation and it is the only one that has not in a way been standardized. Few men go to the trouble of determining just which load will suit them and their particular gun the best and a great majority of sportsmen accept blindly the opinions that were general among the sportsmen of half a century ago, namely: that the surest way to increase your efficiency in the field was to pour a few more shot into the barrel.

It would be difficult to perpetrate a greater fallacy. There is a certain ascertainable balance between powder and shot gauges and game and distances. There is another quite as important ascertainable relationship between the size and strength and peculiar nervous organization of individuals and the weight and proportion of weapons and all of these things have to be properly worked out to develop the highest degree of efficiency, ease and general satisfaction in the field. By this we mean that the individual should have a gun whose weight is suitable to his



An effective pattern, but closer than necessary.

strength and whose other proportions, as length of barrel, stock, drop, pitch, etc., are adaptable to his physical peculiarities. Next there is a gauge that will develop its most effective pattern at the distances that particular game birds are shot at and a certain load of powder will develop in a certain weight of shot the highest velocity and penetration and the evenest, best distributed pattern.

It is a fast, high velocity, evenly distributed load of shot, developing its highest efficiency at assured game killing distances, and not a black smear of badly distributed over-weighted load that gives to the prosecution of sport the keenest zest. Duck shooting at fifty yards and upland bird shooting at twenty-five yards are two distinct forms of sport. They cannot be satisfactorily approximated any more than can a man of medium size and strength stand up shot after shot under the heavy punishing load that is assimilated by some seasoned veteran at the traps.

There is no overlooking the fact that trapshooting in the days of live birds and at the present time of clay birds has had a very marked influence upon the building of guns, the developing of powders and the loading of ammunition and while much of this influence has been for good, there is no denying that a good deal of it has been for harm; particularly does this apply to overloading and a good deal of sloppy sportsmanship, frequent misses, irregular form, wounded birds and slow second birds can be attributed to this error.

Trapshooting and field shooting are two distinct types of gunnery and the net results and the conclusions of a demonstration at the traps cannot be applied literally and without modification to field shooting. The experienced sportsman, the man who shoots afield as well as at the traps and analyzes his work carefully, appreciates this situation thoroughly and usually adapts his load and his weapons to the varied conditions. Unfortunately, however, there are many sportsmen who fail to do this.

If we go back to the early days of pigeon shooting, we

find it recorded that the overloading of weapons was carried to an extent that resolved many matches into mere tests of physical endurance. One of the best known of the old-time pigeon shooters was Capt. A. H. Bogardus, a world's champion who defended his title both here and abroad. The Captain was a man of unusual physique and while the load in general use during this period was 1½ ounces in pigeon matches where there was no limit, he was perfectly capable of standing up under a load of a couple of ounces of shot for bird after bird.

Under the more or less fixed and artificial conditions of trapshooting, there is no doubt that there is an advantage in being able to spray the air with shot, but trapshooting is not field shooting, the conditions are all different and no one realized this more thoroughly than the redoubtable Captain. He was recognized as one of the greatest field shots of his day and had killed thousands of birds for market in those days of unrestricted shooting. Here is what he had to say about loading for the field:

"In loading a gun of ten gauge for grouse I put into my cartridges four and a half or five drams of powder and an ounce of No. 9 shot, in the early part of the season. Later on I use No. 8 shot, and still later No. 7. In November and December, for the shooting of grouse and duck, I charge with No. 6. Some use larger shot for ducks, but a charge of No. 6 from a good gun, well held, will stop a duck as far off as seventy yards sometimes. With a strong charge of powder and shot of moderate size there is greater penetration, and a better chance of hitting besides. When I go out expressly for brant and geese, I load my cartridges with No. 2; but when out for general shooting I have killed many brant and some geese with No. 6. For quail-shooting I use No. 8 or No. 9; for plover, No. 8; for snipe, No. 10."

Today at the traps the favorite load is 1¼ oz. of shot. It is entirely too heavy for a 12 gauge gun, although a

powerful man, whose muscles are well trained, may be able to stand up under a couple hundred shots in an afternoon, the average individual is unable to do so. He may be game for one or two afternoons, but the chances are that his experience at the traps will leave him with a bruised shoulder and a disturbed nervous system. We haven't the remotest desire to get into an argument with any of the aforesaid old veterans who stick to the big loads at shoot after shoot. We are perfectly willing to concede that they have proven the backbone and the main support of the sport for many years, but we do believe that if trapshooting is to attain greater popularity, more consideration will have to be shown to the other fellow, the man of less powerful physique and more sensitive nervous system. He never has and never will be able to stand up under the nerve-racking loads now in use.

BRUETTE.

REVOLVER SHOOTING

Expert and seasoned revolver users assert that .22 smokeless ammunition will spoil the barrel. They don't complain bitterly about it but take it as a matter of course. Well, let it spoil the barrel! It will not spoil instantly and there are more barrels where the first one came from. The rifling of the big guns in the Navy spoil but they keep on using smokeless powder and when the time comes to change the gun or rifling the thing is done.

No doubt smokeless loads are more harsh on the barrel than "semi-black" and there may be something inherent in the .22 cal. that hastens its destruction; however, anyone who has used smokeless, which in the .22 is certainly worthy of its name, cannot help but appreciate greatly its light recoil and report, its cleanliness and as has been intimated, its freedom from smoke.

The explanation of why .22 cal. smokless ammunition alone of all others is injurious to the bore is that the amount and type of priming composition causes corrosion. It takes nearly the same amount of priming composition to ignite the powder charge of a .22 as it does one of the big-bore metallic cartridges which has so large a charge of powder in comparison with its priming, that taken together with the larger bore surface the corrosive effect of the priming is neutralized.

There are thirteen varieties of .22 ammunition not counting B. B. and C. B. caps and blanks. If you call for greaseless bullets the varieties are swelled to an appreciable degree and if you decide on smokeless rather than black another thirteen is added and should you prefer semi-smokeless still another addition is made to the family group.

The original thirteen varieties are: Short, Short Spot-light, Short Hollow Point, Long, Long Hollow Point, Short Colt's, Long Colt's, Long Rifle, Long Rifle Hollow Point, S. & W. Long, Krag-Armory, Extra Long Shot.

B. B. and C. B. caps have hardly enough power to warrant their use in an arm that allows an escape of gas between hammer and muzzle. The Short Colt's, Long Colt's, S. & W. Long and Krag-Armory are but names save for a crimping of the shell and the puny load in the shot cartridge is not practical for anything we have in hand.

Those cartridges having hollow points are for sports-men who use the revolver as an auxiliary for small game on their big game hunting trips. The Spot Light cartridge serves as an amusement when used on an iron target in a gallery having a long enough range to show up their advantage in marking the hit. They will not flash unless shot against iron or something equally as hard. Since the .22 Short and Long Rifle are better balanced loads than the .22 Long the latter may be taken from the list.

The .22 Short is the ammunition for indoor work and the Long Rifle for outdoors. No cleaner cartridges can be desired than these same Short and Long Rifle loaded with smokeless powder and non-lubricated bullets. The makers say they are accurate and the most sceptical will have to admit they are clean to handle and to shoot. The grease on cartridges having lubricated bullets will melt in warm weather and the cartridges become as slip-pery as skinned grapes and as the non-lubricated are on the market, let's have them.

Twenty-two caliber ammunition is the least expensive that holds powder. It is almost impossible to say what they will cost over night as they have never lost sight of their more adventurous sisters of the stock market, but where the Short cost 12 cents two or three years ago

A good companion at home or in the field.

they now cost 22 cents per box of 50 and the Long Rifle have jumped from 16 cents to 33 cents.

If there are any left at this time of the year who are not fully sure the winter solstice is on let them go out and sit in the shade till on their dash for the furnace they admit in no uncertain tones that heat at any price is better than coal at any cost. It is right here near the coal bin that the revolver enthusiast may take pleasure in comfort.

As for the range it will have been constructed in the following manner: Secure a piece of iron 2 feet square and ⅛ to ¼ inch in thickness on the cellar wall so that its upper edge is slanted out some 20 degrees. The thing is easiest done by boring a hole in each of the upper edges of the iron plate through which wires may be fastened and run up or back to the most convenient woodwork. The base of the iron plate may rest on a dry goods box of the desired height and the plate will be heavy enough so that the impact of a .22 bullet will not stir it and its angle will cause the bullets to flatten—not glance—and the spatter be deflected downward.

Two wires fastened to the ceiling of the cellar and their free ends bent in the form of a hook will nicely suspend the cardboard targets about a foot in front of the iron plate. About three feet in front of the target a 60-watt light should be fixed to the ceiling and a sheet of tin placed between it and the shooting position in order that the light may not be seen by the shooter but be thrown directly onto the target.

Ten yards back from the face of the target chalk or paint a line on the floor indicating the distance. The whole thing is inexpensive and perfectly simple with the exception of the lighting scheme near the shooting position. The idea is to hide or shade this light so that there will be no direct rays falling on the sights for in order not to have them blur they should show in silhouette against the target.

The one-inch bull's-eye, four rings outside and two inside, is the proper target for the 10-yard range and as the rings are numbered from 4 to 10 the counting is easily accomplished since 10 shots are fired at each target, the possible being 100. The bullet zips through the target so fast it scarcely stirs it though it hangs in mid-air, but if action is desired a cork may be suspended from a single wire and there will be action and to spare and the bullets will not be agitated off the iron plate. It is well to number the targets as the scores are made and keep them in order to prove that you are improving.

The revolver is the hardest proposition of the entire firearms family to master and therefore advancement will not be over rapid. The group is the thing to lay for and it is far better to place your shots in or near the edge of the bull's-eye than to almost center eight of them and leave two in the northeast curve of the fourth ring. It is right here that you will notice you are improving when the group thickens and there are no strays from the fold. If a shot is inside, on or touching a ring it takes the count for that ring.

It is as easy to tell how to shoot a revolver as it is hard actually to do it. The shooter will work out his own comfortable hold arranging his knuckles and joints well up on the stocks near the hammer, and one of those times when the bead of the front sight as seen through the U of the rear sight hangs for an instant on 6 o'clock of the bull's eye, ease her off so that the hammer will fall dead and sweet, not jarring the arm east, west, north or south.

Practice develops a sense of direction, a feeling similar to that a trapshooter has which may be interpreted as confidence, that sixth sense which all who use any type of firearm must acquire before skill is really crowned. In an arm so small as a target revolver the trigger pull makes itself doubly felt and yet on the score of safety the thing should not be overdone. Around 2¾ to 3

pounds pull will be found just right for the normal shooter. The pull is determined by hanging a weight ⅜ of an inch from the end of the trigger.

With the advent of the first warm days of spring there comes the desire to be off in the open. Undoubtedly the target revolver will go along and after a few shots at objects the revolver will be scrutinized with a new interest. That it has a six-inch target barrel and adjustable sights will be appreciated. Those same little sights are capable of more variations than Old Black Joe on the banjo, and usually a little screw driver comes done up in tissue paper along with the revolver with which to play them.

The club house of a trapshooting association is an ideal place to be along just now with the screw driver, the revolver, some .22 short and long rifle cartridges. Here there are empty target barrels and empty cases which once held 500 shot gun shells. Measure off 20 yards from a mark, place a barrel on the spot and a wooden ammunition case on its top, tack on the side of the case a target having a 2.72 inch bull's-eye. Measure off 30 yards more to the 50-yard mark and on the barrel which is placed there draw an 8-inch bull's-eye.

After shooting it will be found that if the sights are set right for the .22 short at 20 yards they will not be right for 50 yards nor for the .22 long rifle at 20 yards or 50 yards. Unless the sights are adjusted for every change there will have to be one choice of elevation. Since the long rifle cartridges are more accurate for the revolver for 50 yards or thereabout and the smokeless cartridges give but a trifling recoil, the .22 shorts had better be left out of the reckoning when the sights are set for all-around use.

It seems the best scheme to set the bead of the front sight resting on the bottom of the U of the rear sight for the 20-yard range. It is necessary to elevate for the 50-yard range by sighting more coarsely, but this can be done, while if the sights were set for the 50-yard range

the front one would be quite hidden for the 20-yard target. The sighting should be done shooting off-hand and not resting, for the revolver acts differently when shot resting. As the revolver is held in one hand and there is but 6¾ inches between the bead of the front sight and the notch of the rear one, they are very sensitive.

One make of .22 target revolver has a rear sight which is adjustable for elevation and windage. Whichever way it is desired to have the shots go on the target apply the screw driver to the set screws and move the sight the same way. Another make of .22 cal. has a rear sight adjustable for windage and a front sight adjustable for elevation. The rear sight and the frame on which it lies is graduated so that it is easy to gauge the distance it is moved, and, of course, like the former case the sight is moved the way it is desired to move the shots on the target. The front sight, however, should be moved the opposite way it is desired to have the bullets go. The sight leaf is pivoted between two shoulders as a blade in a jack-knife. A set screw on the shoulder nearest the shooter fixes the sight permanently after it is set by a tiny set screw in the forward end of the mounting. When both screws are loosened a coil spring under the leaf forces it up or it may be forced down by turning the front screw in and since the rear part of the leaf and two shoulders are graduated the amount of travel may be gauged.

The sights supplied with target revolvers are the so-called "Paine" sights which present the appearance of a U in the rear sight and a pin head on the front one. An extra front sight having an ivory bead may be purchased extra at a cost of $1.25. Shooting in the uncertain light of the woods compels the use of an ivory bead. The artificial light of the cellar range plays queer tricks with sights and many prefer not only for this but also for all-around use the Sheard gold bead sight.

ANGLING

FISHING THROUGH THE ICE

The ice fishing season is here and in common with other lovers of the sport I am out at every opportunity in all kinds of weather. Not a few of us look forward to it in the late fall with as much anticipation as the boy does to skating time. But I almost never meet on the ice the men I pass while casting in the summer.

Why is this? Does the sportsman of the summer feel that catching a fish through the ice is unsportsmanlike? He might say so if we were to ask him but in my candid opinion the real reason is the failure ever to give ice fishing a fair trial. I laid my tackle away for 6 months for years before I made so much as one attempt at winter fishing. I was afraid of Jack Frost and hugged the radiators in the city until spring.

The ice fisherman cannot employ the arts of summer fishing with light rod and slender line, but he has much to learn before he can consider himself successful. It is a game which must be learned and the best of us sometimes return with nothing but an enormous capacity for food. And then there is that great object of all fishing at all times—the open air. Winter air is certainly open.

A friend of mine takes his vacation in the dead of winter in Northern Canada. He thinks two weeks then in that heat-forsaken part of the world of snow-shoeing, dog-sledging, and hunting are worth a whole summer off in the process of laying by a store of good health. One can do a surprising amount of hiking, lugging and ice cutting without fatigue on a zero day and the vigor gained appears to stay by. The logger comes out of the woods in the spring a splendid specimen of man, the animal.

The principal thing about comfort in ice fishing in our

Northern states or sledging in Northern Canada is being dressed for it. The man who is going out for the first time should put on all the clothes he thinks he will need and then add about as much more. Lake temperatures, with the open sweep of the wind, can not be estimated in the city or by the thermometer. Above all, the feet should be cold proof and dry, although I have fallen in up to my knees and then fished all day without experiencing any bad effect.

The despised pickerel, or snake as the fisherman call him here, is choice eating after the ice has formed. Crappies which are soft and lean in mid-summer become hard and fat. Sunfish and perch are likewise improved. The despised of the summer become worthwhile in the winter, and in my opinion the ice fisherman should be content with them and let the summer game fish, such as bass, pike, or trout, alone.

The ice fisherman, whether amateur or otherwise, does well to fish where other men have made holes, for in winter the location of the fish cannot be judged by the natural signs as in summer. If it is a shallow lake the pickerel will be in the deep parts. In other lakes we find them in 10 to 15 feet or even only 3 to 5 feet of water. Crappies which in summer are found in shallow water appear to go to the deepest holes and stay there during the winter. In some lakes the crappies will bite during the day; in others one must get them just after day break or just before dusk. And in one lake near St. Paul they are hungry enough to bite only between 9 and 10 o'clock at night. In another lake near St. Paul the fisherman can get only large sunfish and must have worms. At times these sunfish want any kind of a worm and at other times they will take only a red worm. Such are a few of the things the ice fisherman must be posted on. He should secure information about the fishing methods used at the lake and when he gets there he should set up near the holes which the natives have made.

A string of sunnies.

For Pickerel I bait a large hook with 3 good sized chubs and put the hook about a foot from the bottom. Since tip-ups are not allowed here, I hang the line over a twig set in the ice at such an angle that the end centers over the hole. The line is lightly looped over this twig so that the fish can pull it off, and I give him 15 to 20 feet of free line in addition. The theory of this is that the pickerel first grabs the lure and like a chicken runs to a quiet place to devour it. A jerk on the first strike is likely to pull the hook out of his mouth; whereas with time to swallow he will get it well down in the gullet.

To land the big fellows in both winter and summer I use a gaff made as follows: Just before reaching the lake I cut a small stick, 3 to 4 feet long, and on the end of it wire a tripple hook. With a little care one can put this instrument under the lower jaw of the pickerel before the eyes appear under the edge of the ice. The fish comes in easily to this point and until he sees the fisherman makes comparatively little effort to get away. In summer this simple gaff enables me to get the big pickerel frequently on his first trip toward the boat.

For winter crappie fishing it is well to have a sinker just heavy enough to take the line down and a cork just large enough to float the line. The bite is gentle and he must be pulled on the first nibble. A stick between 2 and 3 feet long, with aknob on one end on which to wind the line, is convenient for small fishing. Reels, of course, freeze up and are useless. Whereas, the above device enables one not only to handle 30 to 50 feet of line easily but to pick the line up quickly when there is a bite. A stick is much easier to grasp with the mittened hand than a tight line, somewhat frozen perhaps to the ice.

For sunfish the fisherman must likewise have tight tackle. He grabs the bait and swallows as he runs. Consequently a large sinker and cork may stop his swallowing and cause him to disgorge. Unless he is unusually hungry the sunfish in winter time must have a worm merely

looped on the hook once or twice. I use the smallest hook obtainable on the market for the purpose and attach it to the line with shoemaker's thread. It will be noted that the sunfish, even the large fellows, have small mouths, and this is the reason for the small hook.

Don't use an axe for an ice pick. With that otherwise useful implement you will be likely to get two or three baths of cold water and have a miserable time in getting through ice of any thickness. The only thing to use is an implement which can be jabbed straight down. Dealers in large centers have such in stock or a blacksmith can easily make one. Mine consists of an old rasp with a chisel edge welded to a ⅞ inch iron pipe, measuring about five feet long. A joint in the middle may be advisable for the instrument is then easier to carry on a sling over the shoulder.

With the pick on a sling and with a large bag hung at the waist from the shoulder for lines, tackle box and lunch, I have nothing to carry with the hands but the minnow pail. Walking is less encumbered and the hands more easily kept warm. The minnow pail, by the way, should have a perforated cover, for the fisherman is likely to fall down and spill his open pail of bait.

Another thing which I would recommend from experience is a pair of long, heavy wristlets with thumb holes, coming down to the third joint of the fingers. They keep the hands warm while the fingers are used for taking off fish and baiting up. With the hands warm the fingers do not get cold so quickly and soon recover in the pocket or mitten.

Except for some unusual circumstance do not make a fire. There is merit in the exercise needed to collect the wood but none at all in the fire. Artificial heat makes one more susceptible to the cold. A good run around or the chopping of a new hole will start the body burning more oxygen, and this is the best kind of heat.

GILBERT.

JUNE BASS FISHING

The proper methods for early season fishing are not fully understood by most, if one can judge by the way it is gone about on the opening day.

Some do not seem to realize that there are methods of catching bass during one month that will prove to be absolutely a failure during the month following, and in fact all the following season.

Not meaning, of course, that just because it happens to be a different month that the fish have changed their methods of feeding, but if one stops to consider for a moment it will be realized that the difference in the temperature of the water is very apt to affect the appetite of a fish, through the changes wrought by the rather cool month of June, the warmer waters of July and August and still again the cooler waters of September and October, to say nothing of November.

It is a well-known fact that black bass bite better in the cool months than they do in the warm ones, but just why no one has been able to figure out conclusively. At the same time very good guesses may be, and always have been, made, the general belief being that the fish are more voracious, or hungry in the cooler months through the fact that the cooler waters increase their activity the same as it does a human being upon land. This, to a certain extent, however, is a fallacy in so far as the cool waters affect their appetite.

In May and June they have been taking care of the spawning beds and have had no opportunity to go about in the search for the more delectable food, and as up to the spawning time they have had very little to eat in consequence of the long winter's hibernation, they are on the watch at all times for food during the latter part of June, and while the waters are still somewhat cool. And the successful fisherman at this time is the one that selects (accidentally or otherwise) the bait that the fish

are used to finding at this season, and serves it to them in the depths of water at which they expect it to be.

This is the time when the still fisherman comes into his own and the bait caster loses out.

Frogs are all herded up in the shallow, muddy pools where they have been spawning since early spring, and have not distributed themselves around the shores of the lake as they will later on; minnows and "saw-bellies" have not as yet become used to the warmer waters of the surface and the sandy bars, as they will about the first of July, and the bass, when they make a circle of the shallow water along shore and find nothing but worms with which to appease their voracious appetites, are all very apt to swim back to deep water and stay there until it warms up considerably.

Under these circumstances then it is a wise fisherman that goes out on Friday night with a lantern and secures a pail full of lively night crawlers in preparation for Saturday afternoon.

To get the largest amount of enjoyment from this style of fishing the following outfit might be used:

A ten foot fly rod, steel if preferred, twenty-five yards of enameled line, "set" on the reel with a number of yards of last year's line used as a "core." A single action reel with a deep and narrow barrel and with a decided "click" to it. A thin leader of four or five feet of slightly more strength than the line, and some medium sized sproat hooks. Incidentally no sinkers are required.

At this time of year an assortment of baits is not needed, the night crawlers will prove to be enough. Anchor ropes and anchors are also superfluous, as this is not to be a "still" fishing trip, but a sort of modification of trolling.

If it be a windy day, as is very apt to be the case thus early in the season, select a spot slightly protected from the wind by a headland and where the wind has a back

draft to it, making the boat drift this way and that with no decided direction, and where it will move slowly.

Take two lively worms (dead ones will be of no use) and impale just their heads on the hook, and before throwing them overboard see that they are acting as any indignant worm should, coiling around the hook in lively fashion.

Drop them over and row ahead a few strokes, paying out line until there is something between ten and fifteen yards gone from the reel. Now rest on the oars with the rod extending well over the stern, pull off about three feet of line from the reel into the bottom of the boat, and let the wind do the rest.

Watch the tip of the rod to determine whether it is bottom or a fish that the hook connects with, this is something that really has to be learned by instinct.

Presently the rod will bend down slowly but surely, then ease up and straighten with a jerk, a sure sign of bottom. Give a stroke with the oars and watch it again. If the performance is repeated, reel in a little line, as very likely the water is too shallow for the length of line out.

When the right length is determined upon, which will mean when the bait touches only every five minutes or so, tie a tiny piece of cord around the line to mark the depth and sit back and take things easy, only using the oars when the boat becomes stationary.

Very soon the difference between the bottom and the fumbling of a fish at the bait will be seen.

With a fish the rod tip will tremble very slightly at first, remain quiet for a second, then give a few spasmodic jerks that shake the rod from tip to butt, once more remaining quiet. On a sudden it will bend sharply over until the tip touches the surface of the water and the loose line begins to run rapidly from the boat.

If the fisherman be wise it is only now that he will reach for the rod, and with about six inches of loose line

left, strike and strike hard, for a bass will not start away with food until it is well down in its gullet, a fact that a live bait fisherman soon learns to his sorrow, for many a good fish is lost through striking prematurely.

This method of fishing should prove to be a grand success during at least the first two weeks of the open season, when it will very likely be discovered finally that the fish have lost all their appetite for worms, gorged on them by that time, no doubt, and one might fish for a week in this way with never a fish to show for it, except perhaps, a perch or a pickerel or two.

Minnows can also be used to good advantage under these same circumstances and conditions.

Use the same rig, with the addition, if it be thought necessary, of a few split shot to get the bait deep enough, for large minnows will keep the hook on a higher level than will a small one.

Select as a preference the deep water off some rocky shore or headland, and if the wind be fairly gentle try to drift the whole length of it in a zig-zag course, into shore and out again at long angles.

Keep the oars as clear of the water as possible, only giving a quiet and gentle stroke now and then to start the boat in the right direction, naturally making as little commotion in the water as possible.

Fish do not seem to mind the drifting of a boat over head so long as there is no disturbance connected with it, any more than they do the drifting of a log.

After the deep shore has been worked over twice in this way and there be no results, look about and find a shore of the opposite character, grassy, comparatively level banks and water from ten to twenty feet in depth.

When one realizes that the nature of the bottom is, as a rule, the same as the land immediately adjacent to the water line it is easy to select any style bottom desired.

As a matter of fact, this method of drifting can be applied to the use of any kind of bait that is at all prac-

ticable in the early part of the season. Worms, minnows, crawfish and helgramites can be used with more or less success, but the bait par-excellence is, beyond a doubt, night crawlers, and "drifting" with them will net at least sixty per cent, more fish than still fishing.

In river fishing these same methods can be used with even greater success. Hold the boat with the bow to the current and allow about twenty feet of line to drift over the stern. Use one or two split shot as occasion seems to demand.

A few strokes of the oars now and then will keep the line straightened and every nook and cranny into which the current goes may be searched out, usually with a good catch of bass as the result.

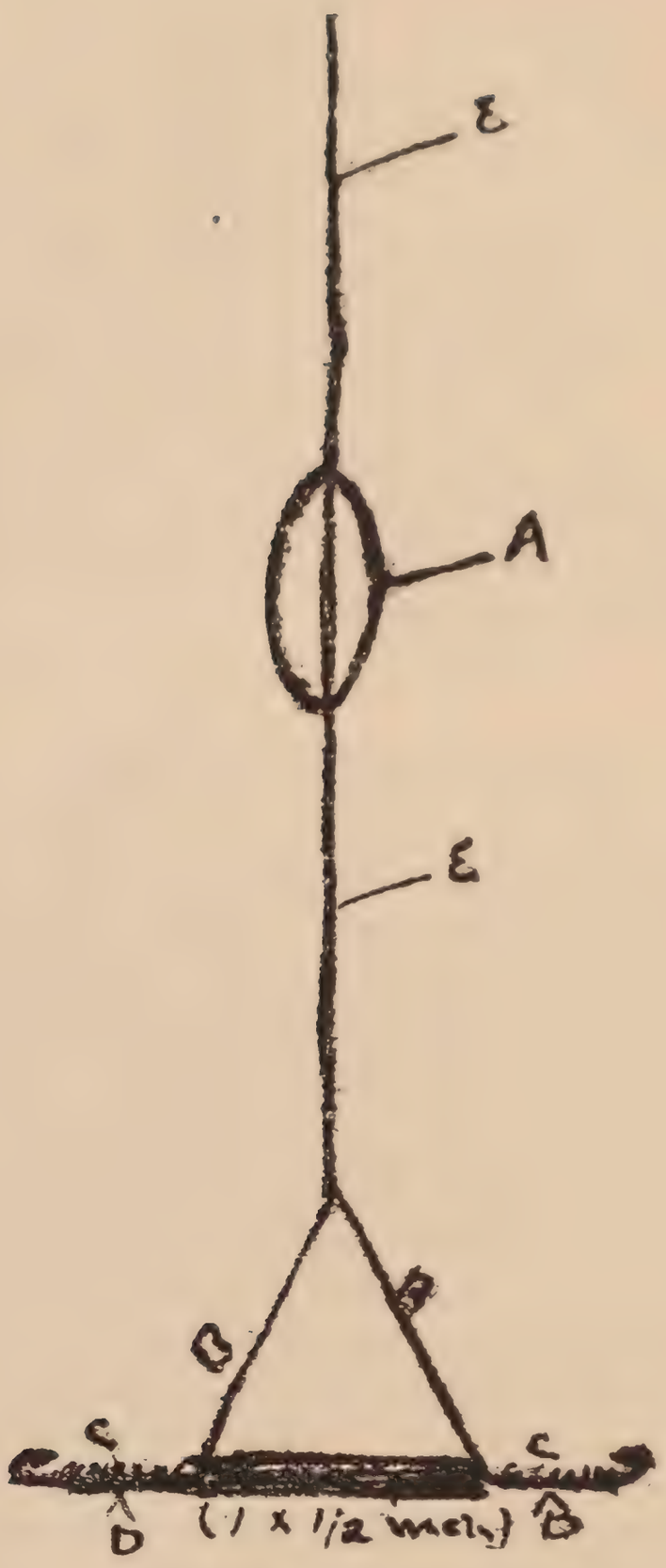
BLACK BASS.

WHITEFISH TACKLE

Having come into possession of an effective method of taking these fish with a hook and line astute Cooperstown anglers guarded the technical details jealously, so for years Cooperstown waxed important in the prestige of being about the only place in the world where whitefishing was enjoyed as a sport and recreation, as well as being the home town of one of the giants of American literature. At least if they prefer to deny that they guarded their secret jealously, it is positively safe to assert that it never became public property, to the detriment of fishermen living in the United States and Canada.

Except for one or two species found in the Rocky Mountain regions which rise to the fly and take bait during the spring and summer, the fish have none of the surging voraciousness of the recognized game fish, but there is an element of uncertainty and a dash of novelty in catching them which amply compensates the angler, although he will never regret the effort when they come to the pan.

Nearly all of the whitefish have a mouth of extreme



Cooperstown Whitefish Tackle.

tenderness devoid of teeth, hence they do not literally bite but take their food, which is chiefly composed of small crustacea and shellfish of the bottom, together with such minnows as they are able to capture, and mull it over until swallowed. Naturally the bite of the fish is extremely delicate, like a barely perceptible nibble and so specially arranged tackle is required for taking them.

The Cooperstown whitefish rig is anything but a thing of beauty but it fills the frying pan—which is more to the point. It consists of an ordinary line of about ten pounds breaking strength. This is tied to a loop 1¾ inches long, the ends of which are in turn fastened to a thin oblong sinker about one by one-half inches in size, through which a small hole has been drilled just above the bottom. The ends of double snell hooks, about No. 10, are inserted in the holes on each end of the sinker and are securely fastened with wooden plugs. The snells are then wound with very fine copper or brass wire for about two-thirds of their length and so adjusted that the hooks remain upright. About two feet above the loop holding the sinker a rubber band one-quarter of an inch by six, or a small coil spring is used, which serves to impart the slightest movement of the hand and keep the bait in gentle motion. A small piece of fish or little minnow is then attached and the rig is ready. As soon as the least indication of a bite is felt the crafty fisherman strikes upward, firmly, but not too hard and proceeds to haul in his catch. The least slackening of the line will allow the fish to disgorge the hook, while rough handling will tear it from its small and tender mouth. There is little struggle or fighting but other factors give uncertainty enough to satisfy any angler. The tender mouth makes a landing net imperative, and even with this precaution some are sure to be lost.

The experienced whitefish angler eliminates luck in so far as he can. He long ago discovered that without the whitefish rig he cannot catch them and although in possession of the rig he can place no dependence on luck, so

when he wants the fish he resorts to a little judicious advertising. He recognizes its value to himself. So what does he do? Why, he goes to the fish market and buys a few pounds of heads and tails, or catches a few fish that are equally worthless as an article of diet, puts them through his wife's food chopper, throws it into the kitchen sink for her to wash, and hurries off to the lake with his minced fish. Selecting a likely locality he anchors a buoy to mark the place and forthwith proceeds to distribute generous free samples of what he has to offer in the shape of food, the same as the biscuit bakers and breakfast food makers.

He knows to a certainty that once his advertising is discovered and sampled by a school of whitefish that they will hang around like a lot of people waiting for a circus parade, so he returns to the village and sits on the hotel porch until bed-time and goes fishing in the morning.

Nor does he select his fishing grounds by guess. He knows that whitefish live habitually in deep water, coming out into the shallow reaches to spawn, which occurs from late October until the middle of December, depending somewhat on the character of the lake and climatic conditions. Besides the regular migrations from deep water to the spawning grounds there appear to be other rather definite movements both in the spring and in the fall, particularly in the Great Lakes, which largely increase the area of distribution. The spring movement towards shallow water commences in the Great Lakes about the second week in April, the fish remaining from four to six weeks, when they return to deep water. The fall movement, which is actuated by the breeding instinct, leads them to begin to seek shallow water on a small scale in September, but does not become generally pronounced until October, when spawning begins. Whether these movements, except that of the spawning season, occur to any appreciable extent in the smaller lakes is not generally known, except possibly to gill netters and a few local fishermen.

Except for a short space of time when the lakes are undergoing certain changes, generally referred to as "working," whitefish can be taken with bait throughout the year.

For years people who live in the vicinity of good whitefish fishing have sworn by the nine Gods of the Ancients that they could not be induced to bite. The present generation and their fathers and grandfathers before them have made repeated attempts to take them with rod and line, but nothing has resulted but disappointment, which is largely responsible for the general belief that whitefish cannot be caught except with a gill-net, a stick of dynamite or a cargo of lime. However, wherever the Cooperstown whitefish rig and chumming method have been employed they have always proved their merits regardless of any difference in species, which seems to be more of a physical nature rather than any difference in habits.

The whitefish family are the most widely distributed in America and now that a dollar will hardly buy much more T-bone steak than the cat can eat it behooves anglers to make the acquaintance of the Cooperstown whitefish rig and swat the high cost of living as often as they can. It's dangerous to eat too much red meat anyway. It produces uric acid, and uric acid produces rheumatism, and rheumatism produces pain, and pain produces the doctor, so it is a dog-gone sight cheaper.

Shaffer.

Effectively mounted.

SPORTSMAN'S WORKSHOP

PRACTICAL TAXIDERMY

The sportsman or amateur naturalist who wishes to preserve or mount his game birds or other specimens is the type of hunter who ought to be encouraged, and it is with this intention in mind that the following article is written.

The author believes that few hunters will readily admit that they go gunning just for the amount of meat obtained in the day's bag, nor will they openly confess to be so bloodthirsty that they love to see the birds drop before their guns just for the sake of killing. It seems that there must be a certain amount of admiration for the game itself, and if it is not the exterior view it is surely not the interior carcass that delights the eye.

When one picks up a dead quail and examines its beautiful markings, a color pattern which nature has taken ages to perfect, does it not seem a pity that this garment of rich brown and sombre gray should be ruthlessly plucked off and cast aside as a thing not even worthy of momentary observation?

Without a sense of appreciation of the handiwork of nature the mounting or preserving of any bird would be a hopeless task, but fortunately quite a number of sportsmen love birds not for the meat that they represent, but for the beautiful plumage which adorns their bodies.

The mechanical operations involved in preserving a bird skin are easily acquired. Using a little patience, perseverance and practice success is sure to come, and the sportsman will find it an interesting pastime with the added attraction of furnishing lasting mementoes of the days afield.

With a particular specimen in mind, say the Bob White, we will assume that it has just been shot or is perhaps

only a few hours dead. The only material required is a slim-bladed, keen-edged physician's pocket knife, excelsior, cotton, cornmeal, needles and thread, arsenic and a pair of surgeon's tweezers.

Begin by stuffing a small wad of cotton into the mouth in order to keep the blood from running out and soiling the plumage. Make an incision on the belly about three inches long, extending from the front edge of the breast bone to the vent. A shallow cut is better than a deep one as it is only necessary to cut through the outer skin.

Proceed by lifting up the skin and separating it from the body. In most birds it will separate readily if the flesh is pushed away from the skin with the fingers or blunt side of the knife.

The joint on the leg forming what is commonly called the knee, or corresponding to the second joint on the chicken, is severed inside the skin.

Care must be exercised here not to cut through the delicate skin. This error may be avoided by holding the fingers under the feathers, thus acting as a guide to indicate the proper depth to which the cutting of muscle may proceed.

During the whole operation of skinning a bird, corn meal should be constantly applied. It is used mainly to keep the feathers from coming in contact with the blood or flesh of the body and answers the additional purpose of giving the operator's fingers a more secure grip on the specimen.

The tail is now held firmly between the index finger of the left hand and the thumb, thus exposing the tail vertebrae, which may be severed at any of its numerous joints.

After the tail is disjointed and the muscles which held it fixed to the body severed, proceed to push the skin with the finger tips forward along the back, thus releasing the tender tissue which holds the hide to the body.

It is better to dispense with the knife at this point, as

the fingers are more adaptable to pushing the skin forward over the wing joints than any instrument.

Sever the wing bones close to the body and gradually push, rather than pull, the skin over the skull until the base of the ears are exposed. These may be released from their cavity by gripping them tightly between the finger and thumb and pulling them out of the sockets.

Next, and very important, is the manner in which the eyelids are skinned. It should be noted that it is well to cut the tissue under the eyelids from one-half to one inch further in the rear of the eyeball than your judgment dictates. You will then evade one of the pitfalls common to all beginners by not destroying the contour of the eyelid.

The rest of the skinning from the eye on to the base of the bill is easily accomplished, but it is well to be sure that all parts are thoroughly skinned, the brain removed and all muscular tissue which clings around the skull scraped away. The neck is severed close to the skull.

There still remains a certain amount of meat and muscle clinging to the wing and leg bones. This, of course, must be removed by using the knife first to release the skin where it adheres tightly to the muscles, and afterwards to dig and scrape away the flesh lying directly behind the large secondary feathers. The small remaining muscles which extend into the extremity of the wing bones can best be removed by making openings on the outside along the portion of the wing which lies closest to the bird's body when the wings are folded. The "drumsticks" are now skinned as far down as the feathers grow; all the meat should be cleaned off these also.

Last but not least in the scraping process. The tail needs attention. The meat all around it, including the oil sacks, must be removed, but care should be taken not to cut any of the large quills which protrude through the skin.

If the specimen in hand exhibits any grease or oil on

The first steps in mounting.

the skin, it is best to pick and scrape this away. The bird is now in condition to make up into a skin.

After the specimen has been turned inside out it should be liberally dusted with powdered arsenic, the eye sockets filled with cotton, and the skin reversed to its former natural position.

Cotton is now wound around the wing and leg bones to approximately the size of the muscles which formerly adhered to them. They are then adjusted to their natural position. The wing bones are fastened together with a thread in such a manner that the knotted cord or thread limits them from spreading to a greater extent than was possible when attached to the body.

A round stick is now cut to conform with the length of the neck and body which has been removed from the skin. This stick should be a trifle smaller in thickness than the neck, and should taper towards one end in order that it may fit snugly into the brain cavity and support the body.

Cotton in thin sheets can now be wound around this stick or core until it is almost as large as the body and neck of the bird. This soft artificial core or body is usually made of cotton, excelsior, or any soft material except paper.

We will now proceed to insert the artificial body with the neck into the skin. The tapered end is pushed up into the brain cavity, thus making the skin very rigid by extension.

It is now only necessary to smooth down the feathers, adjust the wings, sew up the opening cut, and the difficult part of the operation is over.

If the specimen is intended to remain as a skin for any great length of time the bill should be sewn shut with a thread and the whole bird dropped head first into a close fitting cornucopia in order to keep the wings together and make the feathers lie more smoothly.

Mounting Game Birds

The mounting of a game bird such as the partridge, pheasant, or quail is an operation regarded by many sportsmen as quite mysterious and veiled in deep secrecy. There is perhaps considerable ground for this belief, as not a few of the pioneer taxidermists maintained private studios in which no one was allowed to enter while important operations were in progress. Many secret methods were jealously guarded and apprentices were seldom instructed in the fundamental principles of the art.

All of these conditions have vanished in recent years, due largely to the advent of more skillful and broad-minded men entering into this field of work. With the advent of this new area considerable advance has been made, old methods and secret devices have been thrown out, and replaced by skillful mechanical ability, keen observation and artistic talent.

The mounting of a game bird is not a very difficult operation. The work may be accomplished with but little expense. The material, including eyes, excelsior, wire, tow, cotton, and tools should not cost more than twenty-five cents. A bird may be mounted well without purchasing a complete set of tools. One tool only is indispensable in mounting a small bird, and that is a sharp file. Although a pocket knife is used in skinning the specimen it can be dispensed with in the mounting. Patience is the most necessary requirement of the beginner, and if he will bear this constantly in mind, a gratifying success is certain to crown his efforts.

Take for example the Bob White—the bird has just been skinned as described previously, but if the specimen has dried during transportation, roll it up in wet or damp rags over night; it will then be soft and pliable, the legs and wings will of course require more softening than the rest of the skin, but this may be easily accomplished.

The first step in mounting is to prepare an artificial

body made from excelsior as in figure one. This is done by rolling a small handful of the excelsior into a tight compact mass, winding thin cord around the core to make it retain its shape. This core is always started with a small quantity of the material and gradually built up until it assumes the shape and form of the natural body which was removed from the skin.

The construction of the neck is the next part to be considered. It is wound with tow and cord, in the same way as the body, only a wire is used to reinforce it, and attach it to the skull. In this case use a wire about as heavy as a hat pin, but of soft annealed iron, sharpened at both ends, and inserted in the excelsior body (at A, figure one) running through the excelsior form and afterwards clinched over on the end, allowing it to project enough to fasten it in skull. The projecting end of the wire is wound with soft tow as mentioned above, gradually increasing the size until it assumes the shape and exact length of the neck as it appeared in the flesh and posed at the proper angle.

After having constructed the body and neck, the wings are next to be considered. Two wires are now cut one size smaller than the neck-wire. They also should be sharpened at both ends and should have a fine tapering point. Insert these wires one in each wing. Start by pushing the point through from the inside of the skin close to the wing bone, pushing it further along until it reaches the extreme tip of the last joint at the base of the primaries. (Fig. 2). It is now pushed through the tip so it extends about two inches beyond the base of the primary feathers. The other end of the wire is now fastened tightly to the wing bone by winding it with some tow and string, giving it the general shape of the muscle that was removed from this member.

After giving the whole inside of the skin a thorough poisoning with arsenic either dry or wet—some prefer the arsenical soap as it tends to keep the skin soft during

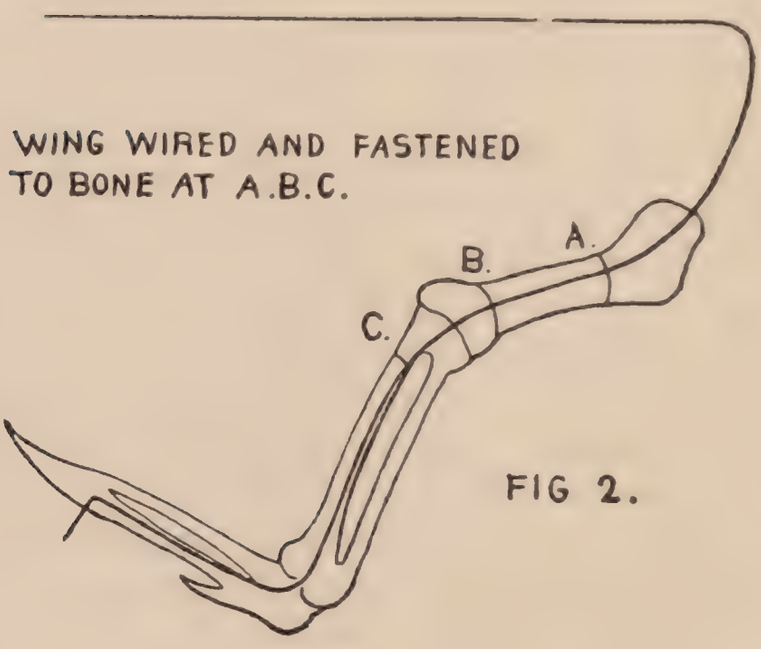


FIG 2.

manipulation and adheres better—the excelsior body and neck are now inserted in the skin, allowing the sharp pointed wire which projects beyond the end of the neck to run through the skull and out of the top of the head (Fig. 3), or better still out through the mouth. The end of the neck should fit solidly into the brain cavity so as to give rigidity to the head.

Following this operation the wires, which project beyond the end of the wing bone and inside the skin, are inserted in the excelsior form (at B, figure 4); they are shoved clear through, returned again to opposite side and clinched. Next, draw the skin down over the back, take a long sharp wire and insert it in the base of the tail, anchoring this extremity in a firm and natural position to the body.

Two sharp wires are now procured for the legs. These should be heavier than the neck or wing wires, as they are expected to support the entire weight of the bird, and to maintain it in a permanent and rigid position so it may not fall over while being adjusted to its proper pose; these wires are inserted in the soles of the feet running up under the skin of the leg through the inside of the knee joint and extending beyond the leg bone where it meets the body. (Fig. 5.)

Around this wire and leg bone wind a binding of tow similar to the method of winding the wings, but making the muscles more carefully and tapering as they appear when the leg is first skinned. The points of the wire are now driven into the excelsior body (at C, Fig. 1), passed through twice and clinched over. The leg should be pulled out a little, allowing a space between the knee joint and body. This free wire allows more leeway or room for moving the leg forward or backward as the proposed position demands. A little loose excelsior is inserted around this exposed portion of the leg wire forming an artificial second joint.

The body opening is now sewed up with needle and

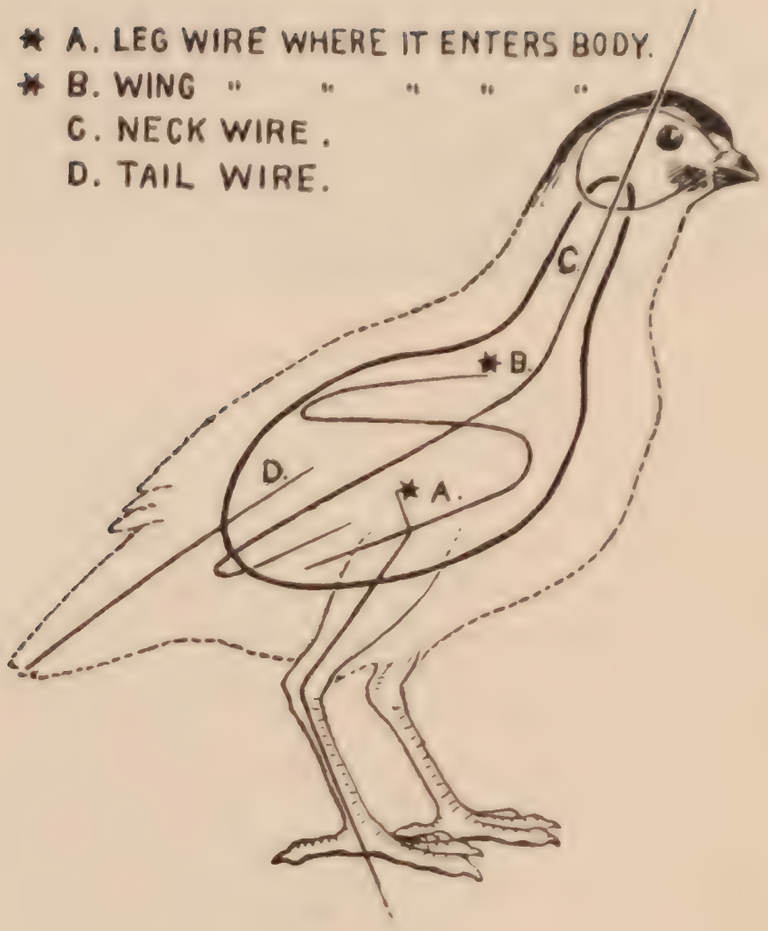

A. LEG WIRE WHERE IT ENTERS BODY.
B. WING " " " " "
C. NECK WIRE.
D. TAIL WIRE.
C
B
D
A

Figure 3.

thread, the legs shoved forward, the feathers preened and arranged and aside from placing the bird on a base, the entire mechanical operation is completed and the bird may now be posed.

Now the artistic talents are called forth and the exact position determined. Adjust the bird in the pose required, making sure that the legs stand in a natural position, and that they assume the proper angle in relation to the body.

A well mounted bird can be easily ruined in the posing of the legs; the most common error occurs in placing them too far in the rear, which gives the specimen an unnatural balance causing it to lean forward in a most ungainly manner.

When the legs have been properly placed and worked into a natural position, proceed to adjust the wings; here very little difficulty should be encountered providing the wires have been inserted in their proper position in the body. The loose skin of the wing coverts are pinned up to cover the bare space above and in front of the wings. Attention is next given to he head and neck; with a twist here and there any desired pose of the head may be obtained with a little patience.

The eye sockets are now filled out and a thin layer of cotton shoved down the throat so that it may assume the desired curve; another thin layer of cotton should be spread around the skull and may be inserted with a stuffer through the eye.

Damp clay or soft papier maché should be worked into the eye socket, and into this soft mass of filling the glass eye is pressed, care being taken to arrange the eye-lids naturally, thus giving the bird an alert wide-awake expression.

The tail is pinned out between two cardboards and spread slightly; it is then adjusted to the most natural angle by moving the wire which supports it in the desired direction. The specimen is now carefully examined so as

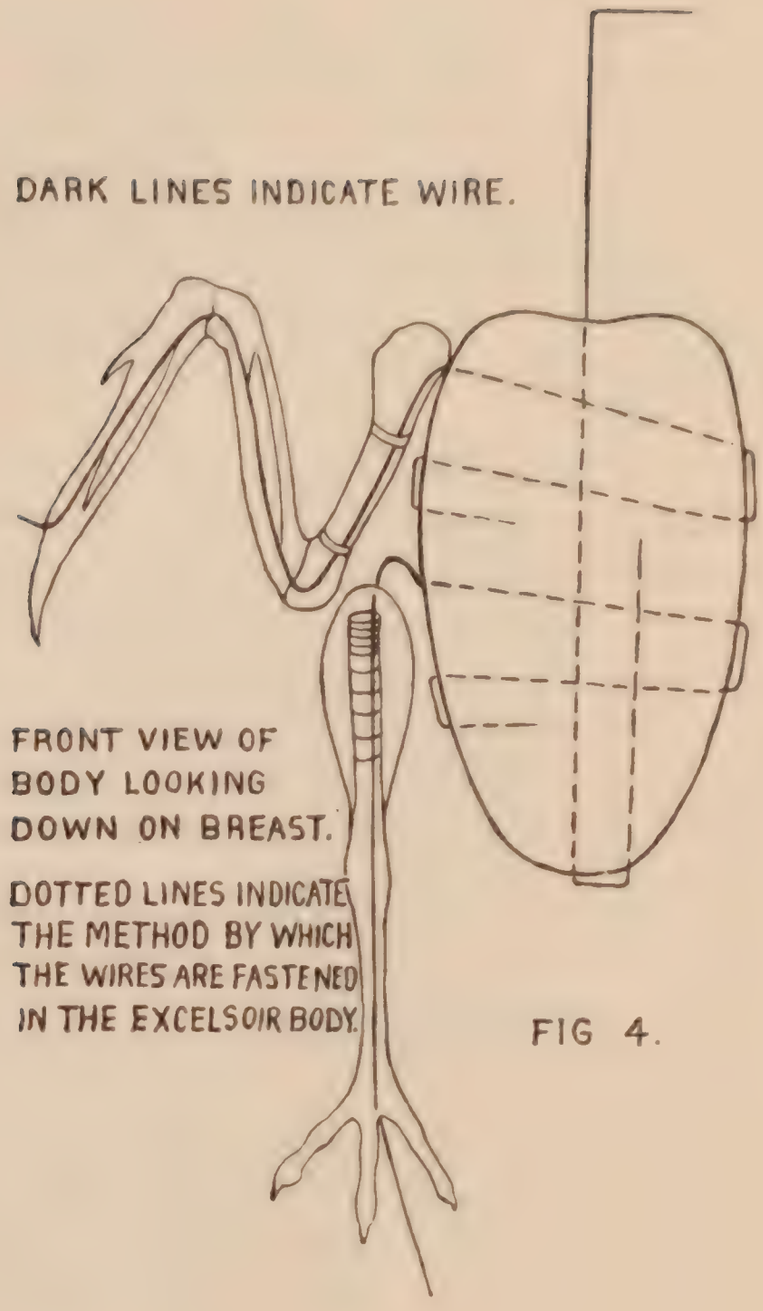

DARK LINES INDICATE WIRE.
FRONT VIEW OF BODY LOOKING DOWN ON BREAST.
DOTTED LINES INDICATE THE METHOD BY WHICH THE WIRES ARE FASTENED IN THE EXCELSOIR BODY.

FIG 4.

A. BONE WITH WIRE ATTACHED.
B. TOW WOUND AROUND LEG
TO REPRODUCE MUSCLE.
B
A
B

FIG 5.

to correct any defects in pose or attitude which may have occurred during manipulation.

Adjust and preen the feathers until they present an even surface. The bird is now complete; and after it has dried for a week or ten days the legs and eye-lids may be tinted in their natural colors.

The preceding instructions apply to the mounting of a bird in a natural pose, but if it is desired to have a specimen appear as dead game on a panel the process is very much simplified; the mechanical methods are almost identical and about half the work is eliminated. In fact, it would be advisable for the novice to use the "dead game" poses at the start, before entering into the more subtle study of attitudes and expression in attempting to give the dead bird a semblance of life.

RESTOCKING A RIFLE

Were I asked to do so, it would be impossible for me to decide, after a lifetime devotion to the rifle, whether I had derived more pleasure from shooting rifles, reading about rifles, or tinkering over them in my spare hours.

I have felt that pride of replenishing the farm family larder with venison, and I know the calm content that goes with trudging homeward on a crisp fall evening with a companion whom you have defeated at a turkey match. That pile of well thumbed *Forest and Streams* in the corner of my room has served me well for many hours, and assisted me to reduce many a pipe full of tobacco to its lowest denomination, as dear old Nessmuk used to say; but as I sit here writing, my eyes fall with lasting satisfaction on several weapons standing in the rack, all cared for with a lover's attention, and whose well polished stocks are of my handiwork. I am not a gunsmith or mechanic, and have only ordinary facility with tools, but such as I have has been developed almost entirely by tinkering over my rifles. I have at various times stocked and then re-stocked them. I have altered blanks and drops, and shaped grips and moulded cheek pieces until now—when I settle my face against them, I can feel that they know me, for they are my own. I have worked upon the rifles of my friends, or rather, we have worked together on them, and have followed every step, from the careful discussion as to length and drop, to drawing the diagrams and selecting the materials. We have fitted wood into iron, and set each bolt and screw with a care that has grown with interest,

evening after evening, with the fascination of a new game, until the polished surfaces reflected each shade of light as the result of our handicraft.

I have progressed so far that I want to tell others how to do it. My neighbor Jones, with whom I had been shooting for years, owned as fine a shooting rifle barrel as I have ever seen, and it had a good reliable lock and action. The barrel had been rifled by a workman who knew his business. It was the right weight, the right length, and finely sighted, and from breech to muzzle there was not a rough scratch or pit on its polished surface. I have seen this rifle repeatedly get away with the major share of the birds at the shooting matches, and our admiration for the weapon was tempered only by the fact that the stock did not match up or class with the splendid action of the barrel. It was one of those stingy little affairs that has nothing to recommend it. It did not hang right, and there was no way you could make it come up to a natural way of shooting. It was a case of cramping your neck and wriggling your head into an unnatural position to get an alignment.

For a long time we had been considering restocking this old gun, and finally got around to it. In an old issue of *Forest and Stream* we had seen an article about restocking Springfields, so Jones ordered the materials needed to construct a stock and fittings to match, all ready to fit and cut: a block of English walnut at $3.00, cast brass Schutzen butt plate at $1.00. In course of time the postman left a parcel from the gunshop and a few hints on fitting a stock. Jones did not know anything about gun stocking, so I was called over to help. Together we marked the design upon the planed block. Looking over our two kits of tools, we found almost everything needed, except a checking tool. The instructions sounded very

simple and the cost of a nice rifle would be small compared to the pleasure of owning one.

An evening of pleasant anticipation was spent in making rough diagrams of just how the grip was to be shaped, and the drop at heel, kind of polish and checking were discussed. Surely Jones would soon be free from the slavery of getting knocked about with the old stock in a long day's shooting. The boys readily agreed to try their hand at sand-papering and Mrs. Jones offered to make a case of an old sheepskin thrown out in the woodshed.

With the clear instructions before us putting on the stock was like a new and interesting game, gaining in fascination as the evenings passed, and each evening brought the work nearer completion. When the work was finally done, the whole family trooped outdoors to see Dad and the boys try a few shots. There was a great surprise when they saw the ease with which a ten ring could be punctured. All remarked at the ease of lining up the sights. The rifle seemed to almost point itself, and no skinned cheeks resulted from the jar of 40 grains of black powder. Each succeeding Saturday shoot made Jones earnestly hope that more lovers of the rifle might see that article and make the family rifle a thing of beauty and efficiency, to be cherished by the sons till their eyes grew too dim for shooting.

What it will cost you to do as Jones did depends on your taste. Send to some reliable shop for parts; many shops keep every part of the gun in stock.

Styles in Stocks

The development of the modern rifle stock has taken a very long time. The styles in use have not changed as often as Milady's apparel, but yet "the world do move." Our great-grandfather had a rifle made up by the local smith, and the following specifications would have been sufficient: American maple stock full length of barrel,

but of boy's size and weight, man-size barrel 40" long; cheap soft iron lock and furniture, stock brass trimmed. The barrel was bored to a gauge of so many round balls to the pound same as a shotgun. How those puny little stocks held up such a heavy barrel is a mystery. The fact is, the soft iron locks usually fell off first. Give me one of that type of arms made by one of our private barrel makers of to-day, bored 28 or 32 caliber for greased bullet, and I care not how many Springfields and other repeating rifles are showing up at the turkey shoots, I would get mine, barring accidents. The barrel would be good for 2½" groups at 200 yards.

We will suppose that you have purchased a block of good imported walnut, hard and heavy. It will cost according to amount of figure or wave showing black on lighter field. Walnut of a hard grade must be used at any rate. Fancy American will cost as much as imported and will not "stay put" at the joints with metal. You should pay two to six dollars. Get it thicker than a shotgun stock as you want a nice cheek piece. It will, of course, be made with a short full pistol grip, otherwise you could not improve much on the dollar-six bits stock, factory machine made to place on the corn sheller variety of guns. Why they do not put on stocks to support the face in aiming, giving a real controlling grip for hands, no one seems to know.

Now be sure you know what shape you want. Ascertain the method of fastening, whether a through bolt like a Ballard or tang straps like Winchester and Stevens. The long bolts through stock from butt are best with cheap soft wood, as you can tighten it up if loose. Always bore this long bolt hole first or get a gunsmith who sold you the block to bore it for you. That would be sure and cheaper in the long run, as it takes two augers.

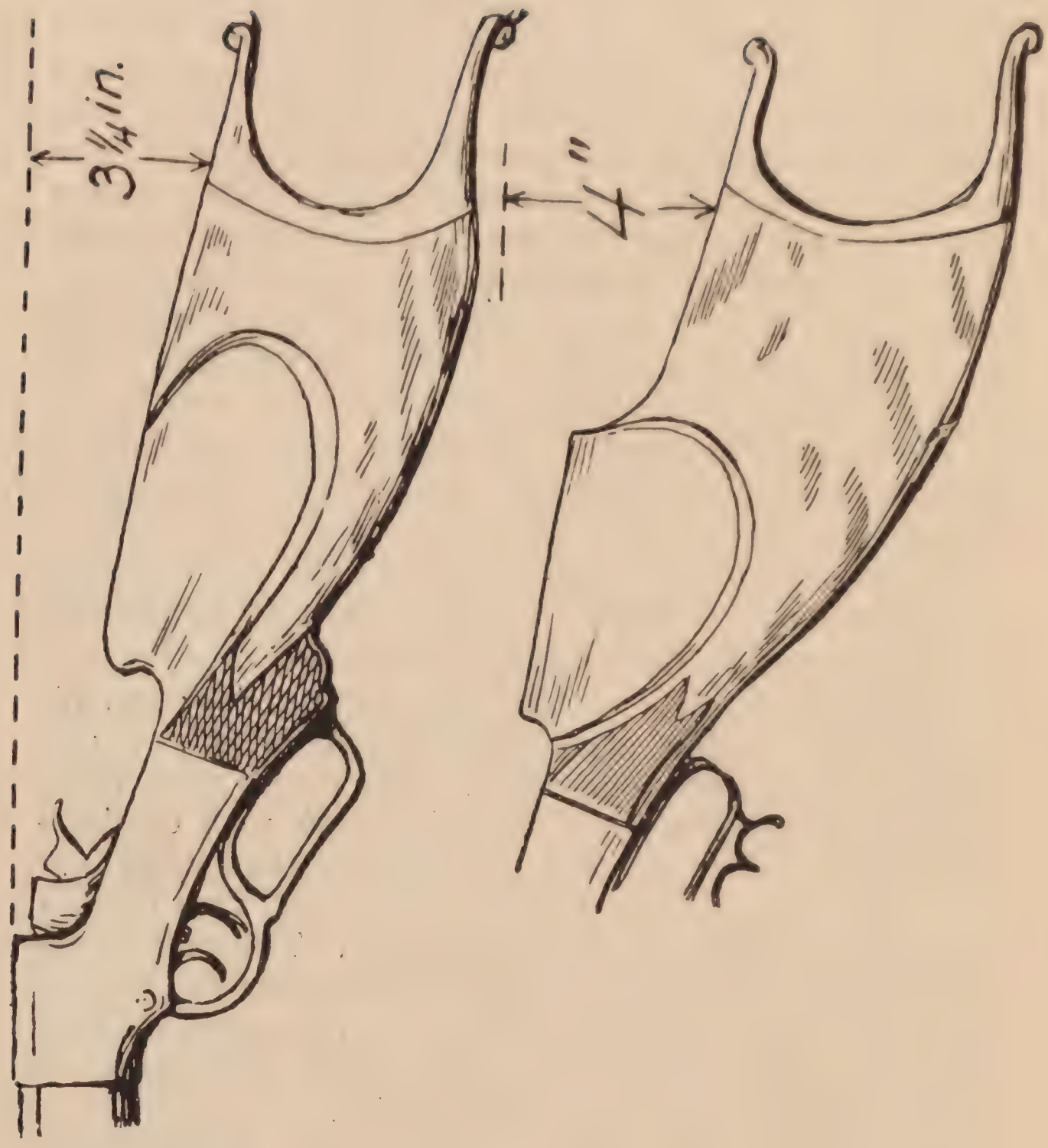
Buy, borrow or purloin a very narrow chisel and one of about ½", then sharpen as keen as razors to gouge out for tang and trigger plates, if of Stevens or Win-

chester make. Mark around tank very close with a scratch awl or sharp pencil. Drop in the straps, carefully keeping a very tight fit. Blacken the metal with lamp black to see where it fits too tight; then cut off the high black spots, and remember you cannot put back what you cut away by mistake. Gradually drop down into wood and fit tight against rear of action at same time. The stock must not be shaped in any way till action is on and tight. Join the two up tight and drill screw holes a little undersize. Drive in screws; if they hold the wood and metal close and tight, all is well, otherwise start over if you have room. If not, scrap the block and get a new one, for it will shoot loose and be worthless. I believe a shaky stock makes a rifle an inaccurate shooter.

When you have tightened up screws not a crack should be seen, then the oil or varnish will make your lock nearly dust and rain-tight. The old model .44 Stevens was hard to fit tight, and it had upper and lower straps, cast integral and very long. I had to cut and shove in lengthwise, which was harder than it appears on paper.

Next start shaping for butt plate as at action; saw off at 13″ from trigger, plate will add another ¼″. Screw this plate on after drilling holes. Now cut all wood down to metals. Remember this is a rifle stock with considerable drop. A shotgun stock is straight to catch up quickly and shoot high at rising birds. Four-inch drop gives a very natural standing position off-hand. This drop is not stylish, but is used by most of the best shots and private gunmakers for off-hand shooting. Make a line on drop of stock to line up with sight, then leave this in center of work till finishing as it acts as a guide.

Try fitting on, or rather leaving on, a big fat cheek piece 1″ thick, not one of those so-called ornaments that factories charge $5.00 to put on and be useless. It helps to steady the eye by giving the face a foundation to rest close against while aiming. Anything is beautiful which is the best form to do a certain alloted work. Cut away


3¼ in.
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4

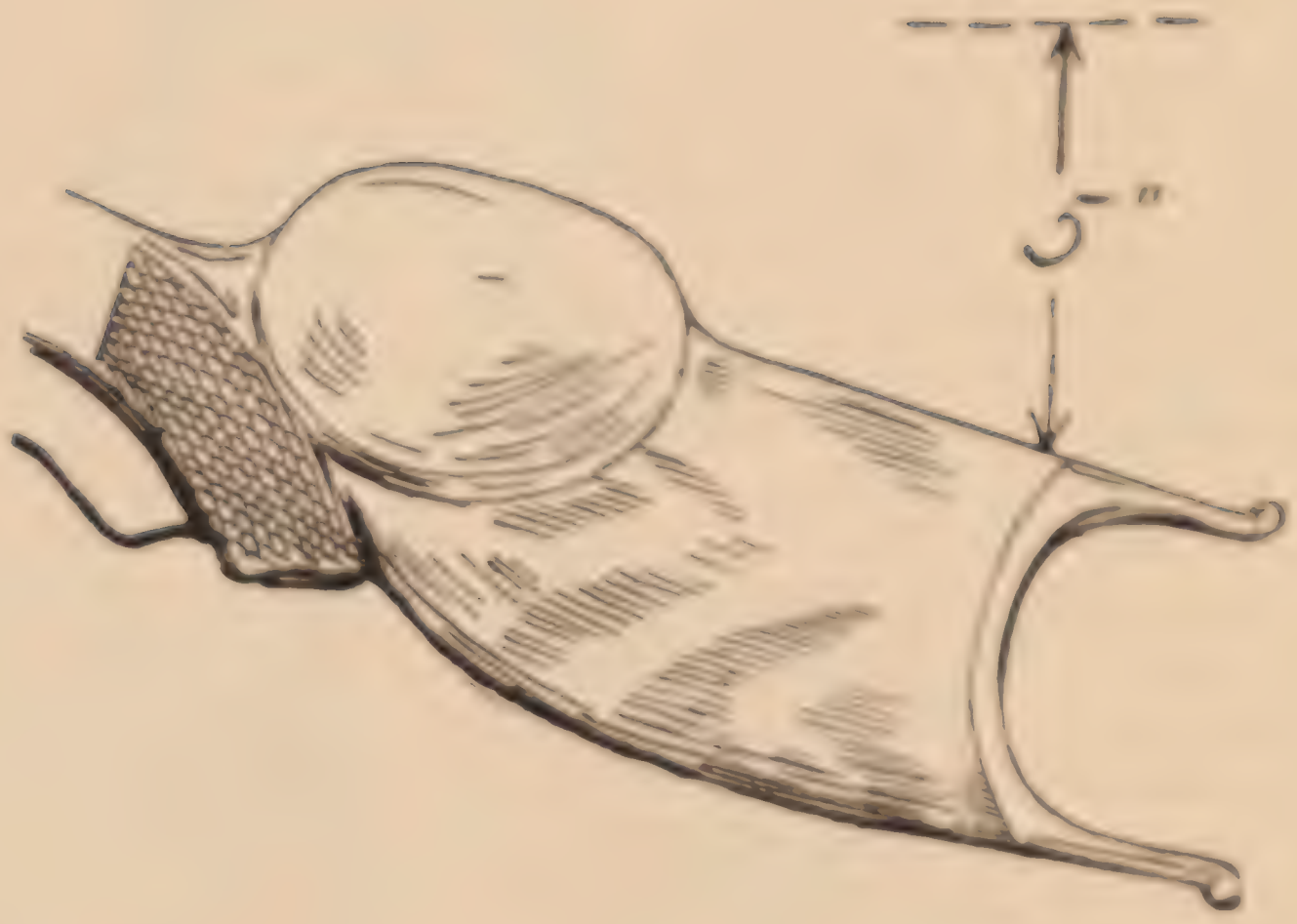
after marking out cheek piece, using a chisel and round edge file. Make every corner sharp, every curve a true one. Top of stock should be planed straight; round off with file all over.

Cheek Piece

The beginner must remember to leave the cheek piece to one side of center line of stock before shaping up on any place. After the stock is roughly modeled, as it progresses toward perfection, all the little personal adjustments must be made to make the gun fit you exactly. In making these adjustments sometimes a quarter of an inch is a matter of great moment. A professional gun fitter would go about it with a try-gun. The amateur gunstocker can get some good points from his method of procedure. A shooter is measured with a try-gun as follows: The adjustability of the try-gun as to length of stock, cast off and drop of comb and heel is explained. After advising that the breadth, height and usual shooting position of the shooter governs his measurements, the expert takes up separately the different parts of a gun that should fit the shooter. First, he measures the length of stock required by resting the butt of the gun in the bend of the arm, finding at what length the fore-finger comfortably reaches the trigger. Then the expert has the shooter take the gun in his natural shooting position; studies carefully the position of the butt and the comb; makes the necessary adjustments until the butt finally fits the shooter's shoulder and the heel has the correct drop.

Comb

The comb is a harder proposition. The shooter's eye has to be sighted, and attention paid to the way he "cheeks the gun." The expert then adjusts the comb several times until it fits snugly to the shooter's cheek, making sure that it is impossible for the shooter to hide his sighting eye behind the breech of the gun. To note these points,


5"

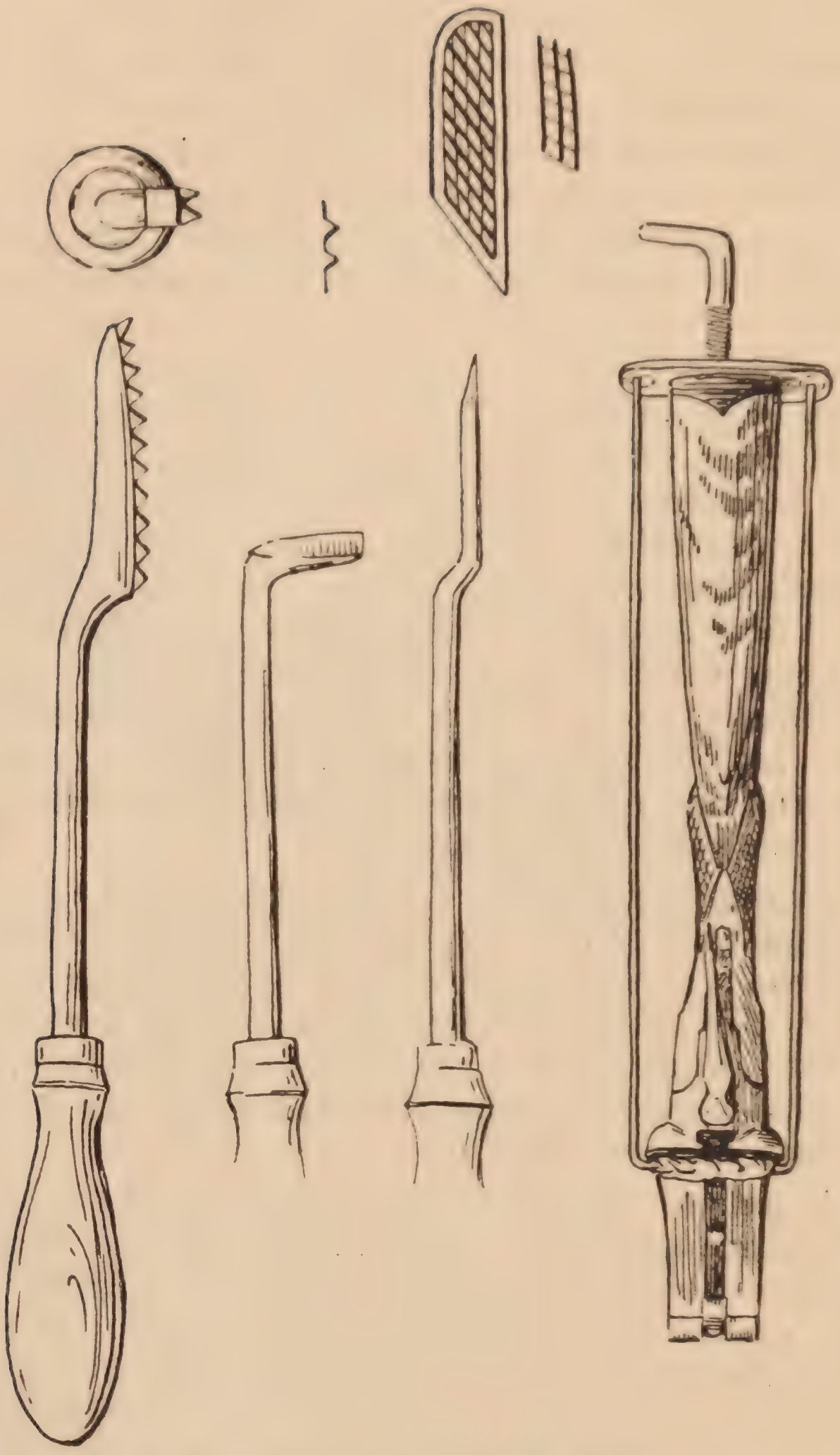
he stands in front of the shooter, making proper adjustments. He also observes whether or not the stock must be cast-off, if so he turns the stock to one side, and makes a slight alteration in the setting of the comb.

After satisfying himself that the gun is a correct fit for the shooter, the stock is locked. This completes the task and the shooter has the measurements for a gun that fits properly and enables him to shoot better off the traps or afield.

Finishing a stock takes time and patience. Leave no sunken holes in filling down; wet, heat and sandpaper several times till fuzzy grain quits raising. An oven is fine to heat wood in for about two minutes. Finish with number one steel wool. Do not spare the arm, so the wood is smooth as glass. Give one heavy coat of orange shellac, dry till next day, smooth with steel wool, apply thin coat of rubbing varnish, and set it in dry warm room for five days; then rub until smooth with powdered pumice-stone on wet rag. If holes appear you will put on another coat of varnish and rub with pumice again till all dust marks and brush streaks disappear.

Accompanying this is a cut of checking tool and other useful tools. Lay off checking with a piece of cardboard first; bend it around grip and mark with pencil on varnish. Start at left letting one tooth or rather all teeth follow last cut. Practice on a board first till proficient. Oil cuts with stained oil, using rosewood stain, and checking will show fine and clear.

It is well to remember that a true stock of a try-gun can be made smaller or larger at will, but that whatever you shave from your gun stock cannot be replaced. This means caution and careful work at all times. It means patient, loving work. I might almost add, and if your only idea in restocking a gun is to "get it done cheaper at home" you might better save your pennies and have a professional build one for you, for there are few jobs on which genuine interest plays a keener part.



Checkering tools and stock clamp.

Every man loves a gun. The possession of a truly fine weapon is a source of satisfaction that is very dear to the man with the instincts of true sportsmanship; and a worthy rifle barrel, which has been restocked with care and discriminating taste is one of the most cherished bequests a father may leave his son as an expression of his own individuality.

—*Lovell*

Stock Finishing

To a great many people, wood finishing is more or less a mystery, and the mystery idea is encouraged by experts in this line; in this article I will try to dispel this idea and give you some of the benefit of my twenty years of varied experience.

Woods are grouped by finishers under two heads. First: Close grained woods, such as maple, bamboo, pine. Second: Open grained woods, such as mahogany, walnut, ash, and oak. Each requires a different treatment, so I will give both; these directions will also apply to house-finishing or any natural wood-finishing. Gun-stocks are usually of walnut which is an open grained wood; for new work before you begin finishing, be sure your wood is dry, free from grease or oil, and sand-papered smooth, then procure some high-grade Walnut Paste-Wood Filler; thin this to the consistency of cream with benzine; brush on a good heavy coat, and allow to stand about twenty minutes; get a piece of burlap and rub it hard across the grain of the wood till all the pores of the wood are filled. You may find it necessary to apply a second coat after twenty-four hours. If so, proceed as before, then allow to dry for twenty-four hours, then sandpaper lightly until smooth. Now you are ready for the varnish. After the most exhaustive tests on auto trucks, aeroplanes, boat-work, and with guns and rods, I have found that Valspar is the best all-around varnish in the world, and I think I know them all. It will stand more abuse and ill-usage than any other

varnish. It will not scratch or mar white, or turn white in hot or cold water, and is not affected by oil, grease, alcohol or ammonia. These superiorities will be appreciated by men who give their hunting and fishing gear hard usage. Now that you have your varnish, get a good, clean varnish brush, a flat bristle brush, an inch or inch and a half wide. Be sure it is clean and has no loose hairs. Whip the brush over your hand to get rid of them; now apply a coat of Valspar, going over all of the stock, including the cut-out portions, where the locks are let into the wood. Only one coat should be put on the parts in which the locks and other metal parts are let in. This is to keep the oil and grease from penetrating the wood and discoloring it. The cut-out parts are not to be filled with the Paste-Wood Filler, however. Allow the Valspar twenty-four hours to dry, and then sandpaper lightly with a fine sandpaper. Now give it another coat of Valspar and allow it thirty hours to dry. Sandpaper this coat the same as the first coat, then apply another coat of Valspar. Allow thirty-six hours to dry. Now get a piece of rubbing-felt or a piece of Brussels carpet that is clean. About two by four inches is a nice size. Dip this in some water and then in some finely powdered pumice-stone, and rub the length of the wood. This will take some elbow-grease, and you must be very careful on edges and ends or you will cut through the varnish coats, which will spoil your job. As you rub, from time to time wash off the pumice-stone so you can see how your work is progressing. The object of this rubbing is to get a clean, smooth, even surface. After this is obtained, you will have a nice, dull finish. Remember a varnish coat is not very thick, so be sure not to cut through the outer varnish coat while rubbing. If you do not care for so dull a finish, clean the work carefully and apply a good polishing oil of some sort; even furniture polish will do. Rub over lightly and then wipe off clean. Polish lightly with your bare hand. This will give you what is called an egg-shell gloss. If a

high polish is desired, after you have finished with the pumice-stone rubbing, allow six days for the work to harden. Then polish by rubbing with finely powdered rotten-stone and crude oil, using a piece of Brussels carpet to do the rubbing with. After getting as high a polish as you can with this, clean off the work and wash your hands. After your hands are dry, dust a very little of the dry powdered rotten-stone on your hands, and rub briskly. This completes a hand-polished job.

Re-finishing is done by the same processes, with the exception of cleaning off the old finish. This is usually accomplished by applying a coat of good varnish-remover, which will loosen the old coats and can then be scraped off. You may have to apply more than one coat of remover. If you use varnish-remover, after you have removed all the old finish, wash well with gasoline or benzine and allow twenty-four hours to dry. The old coats can also be removed by sand-papering, scraping with a piece of glass or steel scraper. When you have removed all the old finish, you may find some dents in the wood. If you are going to do a "bang-up" job on some old friend of many a hard day's shooting, moisten a couple of thicknesses of blotting-paper with water, lay over the dent, and apply a hot flat-iron. Watch it closely to see that it does not char or discolor the wood. It will take some time, but you can raise the dent up even with the surrounding surface. After this is done, sandpaper smooth and proceed as with a new stock.

Dents and cracks can also be filled by getting a Walnut Shellac-stick. Apply shellac by heating a thin-bladed knife and applying it to the end of the shellac-stick till it softens and runs, then you can transfer it to the place you wish to fill, and then force it in till it is all even with the surrounding surfaces. Allow this to harden again, then sandpaper smooth. If you do this neatly, no one will be able to detect the camouflaged part.

If your gun-stock should happen to be of maple or other

close-grained wood, just omit the paste-wood filler, using only the Valspar. All finishing work should be done in a clean room; there should be no dust or dirt around to get in the fresh varnish. It used to be necessary to have a hot room for varnishing, but using Valspar, this does not make any appreciable difference, as it will dry anywhere with any ordinary temperature.

In wood finishing, do not be in a hurry—take time and take pains; it will pay. The labor of all finishing or painting jobs is the most costly item, so it is very foolish to skimp or try to save on tools or material.

An amateur, by following these directions, and using some brains should produce a very presentable job.

—McCarthy

REFINISHING GUN STOCKS

It is practically certain that nearly every reader of this encyclopedia is what is usually called a "gun crank" and being afflicted in this manner most of us take more pride in the appearance of our firearms than in almost any other form of personal property that we own.

Since childhood I have been an admirer of beautifully grained walnut. Few things give me greater pleasure than to examine a superb piece of this beautiful wood, especially if it is in the form of a gun stock.

As is quite natural in a lifetime of shooting, I have collected a few choice weapons, every one of which, except one, is equipped with a very beautiful stock. Others that I have owned have passed on their way. For some reason or other I never seem to be able to get up courage enough to sell one of the old favorites. It is true that I have tried to do it time and time again but every time I get out one of the fine looking specimens I cannot help but feel that it would be a mean trick to sell a gun with a stock like that, and so it goes back into the gun closet.

Unfortunately in time all the old favorites that are used for field shooting or big game hunting and sometimes also those that are used for target shooting take on a weather-beaten and battle-scarred appearance. The passing of the old worm fence was as hard on gun stocks as it was on quail because nothing can equal barbed wire fences for ruining the appearance of a piece of choice walnut. Many hunters are almost convinced that they were designed for that particular purpose. Very fortunately a badly scarred stock if it is not cut or chipped too deeply can nearly always be refinished to as good or better than new, and the work, except possibly for the first part of the job, is neither difficult nor very tiresome, and the total expense of refinishing a half dozen gun stocks is not over one or two dollars.

In refinishing stocks the first thing to decide upon is whether a dull oil finish or a glossy oil finish is desired, because it makes considerable difference in the method of procedure. It is also possible to have one form of a glossy finish with a dulled surface. Few persons desire a varnished stock at this time, especially if it is to be used for field shooting, and so we will not take the time nor space to describe this method of stock finish. If there are several guns that need refinishing it is much the better plan to refinish all of them at one time because by doing the work in that manner it will entail considerably less expense and the work can be put through much faster because the same operation can be performed on each gun at about the same time, and this saves mixing up of solutions.

In finishing a new stock the first thing to do, of course, is to buff down the surface of the wood to the desired contour and then remove all of the scratches by the finest grade of steel wool, but in finishing an old stock if it has been varnished or shellaced the first thing to do is to remove the varnish or the shellac. It is almost impossible to get this off with emery, sandpaper or steel

wool because the abrasive will not bite fast to the varnish, but it can be dissolved and rubbed off easily by the aid of varnish remover. After the varnish remover has been applied and all of the hard, glossy surface has been removed, the next step is to take the coarsest emery paper that can be secured and buff off all the scratches. Do not spare the deep cuts unless so much wood must be removed that it will destroy the contour of the stock at that point because as soon as the stock is again oiled all of the scratches that remain will show up as distinctly as before.

Sometimes part of the opening in very deep cuts can be filled up with red putty, fibre, wood filler or other material of this kind without showing a very brilliant contrast to the remainder of the stock. Such cuts are seldom encountered as the removal of a thirty-second to a sixteenth of an inch of the surface will remove nearly all of the scratches.

After each cut and scratch is buffed out so thoroughly that you cannot trace the outlines when the stock is examined in a strong light it is time to think about applying the fine finish, but not before. Never try to buff out bad scratches with fine grades of steel wool and sandpaper. It takes too much time and a great deal of hard work, and this method of procedure gains nothing. In removing the scratches it is very necessary to be careful to keep the emery paper off the checkering on the stock and fore-end because it will ruin it. Cuts on the checkering had better be left alone or else filled up because it is impossible to remove them by buffing them off without destroying the appearance of the remainder of the checkering.

It is possible to cut a block of fancy shape out of the checkering and get rid of a bad cut in that manner, but the surface exposed will always be below the surface of the checkering and blocks of this kind should

always be equal with or above the tops of the diamonds of the checkering.

It is also important to keep the emery paper off the steel parts of the weapon because the blueing will be badly scratched. It is always better to remove all metal parts such as the receiver and action, because nearly always they will be the worse for wear. This is particularly true if shellac is used in the finishing process because the shellac will stick to the fingers of the operator and will be transferred from the hands to the steel, and once it gets on the steel it is almost impossible to remove it, especially if it has dried on. At any rate it cannot be removed without varnish remover or something of that kind and if you have a stock that has not previously been varnished you will not require the varnish remover.

After the scratches have all been removed and the contour of the stock is all evened up, take the finest grade of steel wool or sand paper obtainable and finish the job. This will be 00 Steel Wool. Keep at it until every visible scratch is removed, including those made by the coarse emery paper. The only way to test this out thoroughly is to look at the stock from all angles in a bright light because otherwise quite a few scratches will be visible as soon as the oil finish is applied.

The stock should then be wet with warm water and allowed to dry. This will raise the grain of the wood. This should be immediately sandpapered down with sandpaper or steel wool and the process repeated two or three times until no more pores show up. If the gun will not be used in wet weather this is not necessary except with a very coarse piece of wood, especially if shellac will be used in the finish.

In setting a stock away to dry be sure that it is not placed behind a hot stove or in front of a very hot radiator because if the wood is not thoroughly dry it will

crack badly, especially at any places that might be under strain from screws such as the tang.

After the pores have been rubbed down for the last time and all the scratches have been removed we are ready to apply the final finish.

Dull Finish

If it is desired to have the dull London oil finish, which is the most attractive type to apply to most of the stocks that are well grained, all we need to do is to mix up our solutions and then rub them on with the hand or with a piece of felt or some other soft cloth.

The best solution for this process is two parts of raw linseed oil and one part of turpentine, as the addition of the turpentine will make the oil dry faster, and it is possible to apply a large number of coats and rub them in well in a much shorter length of time. The number of coats to apply depend altogether upon the patience of the operator, and the actual value of the piece of wood that is being refinished, because, as you can readily see. a very fine piece of walnut is worth much more effort than a comparatively plain piece.

If the wood is open-pored in texture many people get better results by using wood-filler, but I have never been successful with it because the stock always gets streaked, and so if. I have a piece of wainut that is open-pored I apply the shellac finish and then dull it off later.

The Glossy Shellac Finish

After all the scratches have been removed, after raising and removing the grain, obtain a supply of orange shellac and pure linseed oil, placing a small quantity of the shellac in one receptacle and an equal quantity of linseed oil in another. Make a pad of cheesecloth or any other soft material and rub oil well into the stock. Dip it into the linseed oil again, then into the shellac and then rub this into the stock and keep on repeating it

until the wood absorbs the mixture. Friction has a great deal to do with the quality of finish secured. Keep on applying the mixture in this manner until the stock has taken up all that it will hold, and let it dry for a day or two. Then take fine steel wool and rub it down to a dull finish.

If there are bright spots on the wood where the grain is not filled, repeat the operation. Let it stand until dry and then rub it lightly with the fine steel wool until the spots have disappeared.

To obtain the glossy finish the final rubbing of oil and shellac is applied until the glossy finish desired appears. Some times the mixture on the pad will get gummy and stringy, which makes a very messy looking job. This is because you are using too much shellac. If the pores do not fill up properly the operator is not using enough shellac and should use less oil.

To obtain a dull shellac finish after the bright finish is secured the stock should be rubbed down with Pumice-stone and oil. This makes a very beautiful job.

Which finish to select depends upon your personal preference and the appearance of the wood in the first place. The dull glossy oil finish is the best one for a real fine grained piece of walnut. The glossy shellac finish is the showiest, while the dull shellac finish is probably the best one to use on a stock that must be subjected to a great deal of wet weather. This last-mentioned finish is very beautiful and brings out the grain splendidly. The dull oil finish mentioned in the forepart of the article can be improved considerably by applying several coats of paraffin oil. This is just rubbed in by the hand and seems to improve the richness of the color of the wood. I have used it on wood that was a brilliant red and very finely grained, and it brought out the color very nicely. Paraffin oil does not dry into the wood very well and it will require considerable rubbing and quite a number of applications to get the desired amount of oil into the

stock. One of the best ways to apply this is to rub in a coat of linseed oil and then apply a coat of paraffin oil and repeat in this manner.

About the only secret connected with refinishing is the number of applications required. A good many persons who are expert at applying a finish of this kind will try to make it apparent that it does not take much work but the actual truth of the matter is that an oil-finished stock made in the dull London oil finish, in which no shellac is used, takes quite a number of applications, but these can be applied at any time—every time you look at a gun, for instance, and the more the stock is rubbed the more beautiful it will appear.

The matter of stock refinishing can be attended to at odd moments, and the cost is so little that it would pay sportsmen to refinish their own stocks either for their own pleasure or, in case they wish to sell a good grade gun, because nothing detracts more from the appearance of a fine weapon than a badly scratched stock, especially if it contained any varnish in the first place.

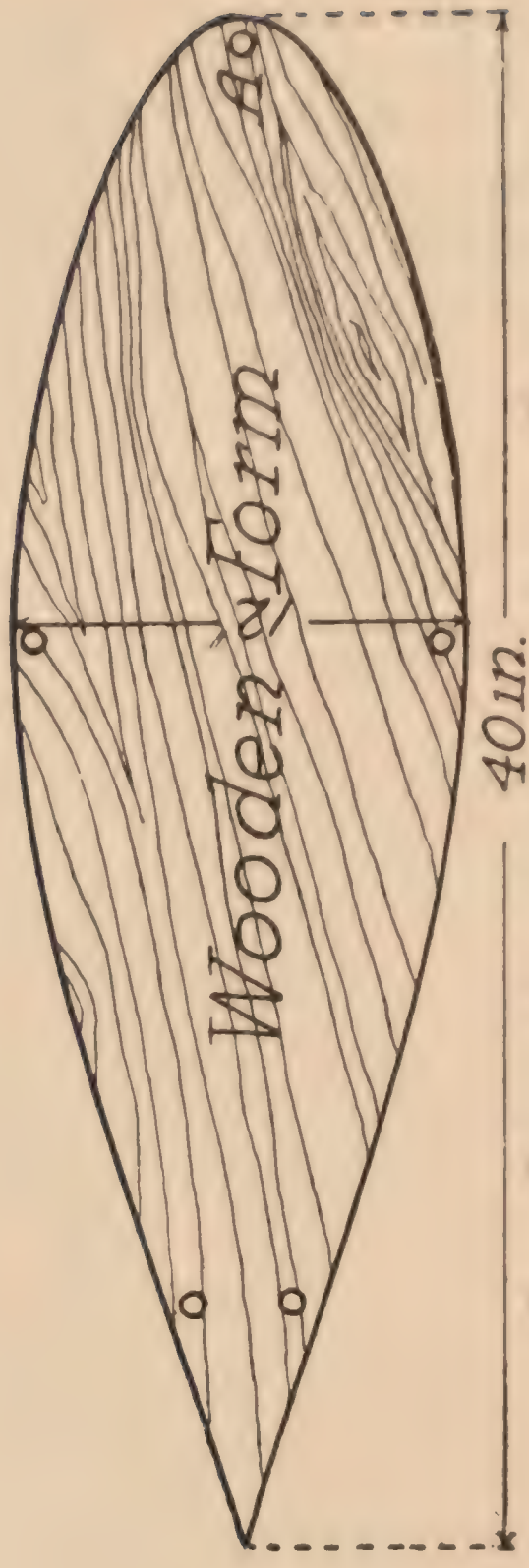
In dull stock refinishing it is always a good plan to remove the butt plate, especially if quite an amount of wood must be removed from the stock because otherwise the fibre, rubber or steel surface will become badly scratched and detract considerably from the appearance of the finished job.

If it is necessary to pare down the edges of the butt plate slightly to make it fit, this should be done and then it should be polished before it is replaced.

In all stock refinishing operations on stocks which are milled out considerably to fit the frames of shotguns or of bolt action rifles it is necessary to exercise considerable care to see that a well-grained piece of wood does not warp while it is removed from the action or otherwise there will be considerable trouble to fit the action properly when it is replaced, and for this reason it is best to replace the stock when the scratches have been

removed except when a shellac finish is being applied. A very light stock can be darkened by applying wood stain before oil or shellac is applied in the finishing process.

A refinishing job of this kind may look like quite an intricate proposition until you have tried it but it is practically impossible to spoil a stock that is badly scratched and therefore anyone can undertake anything of this kind with confidence in the fact that he will surely improve matters, and cannot possibly make them worse.



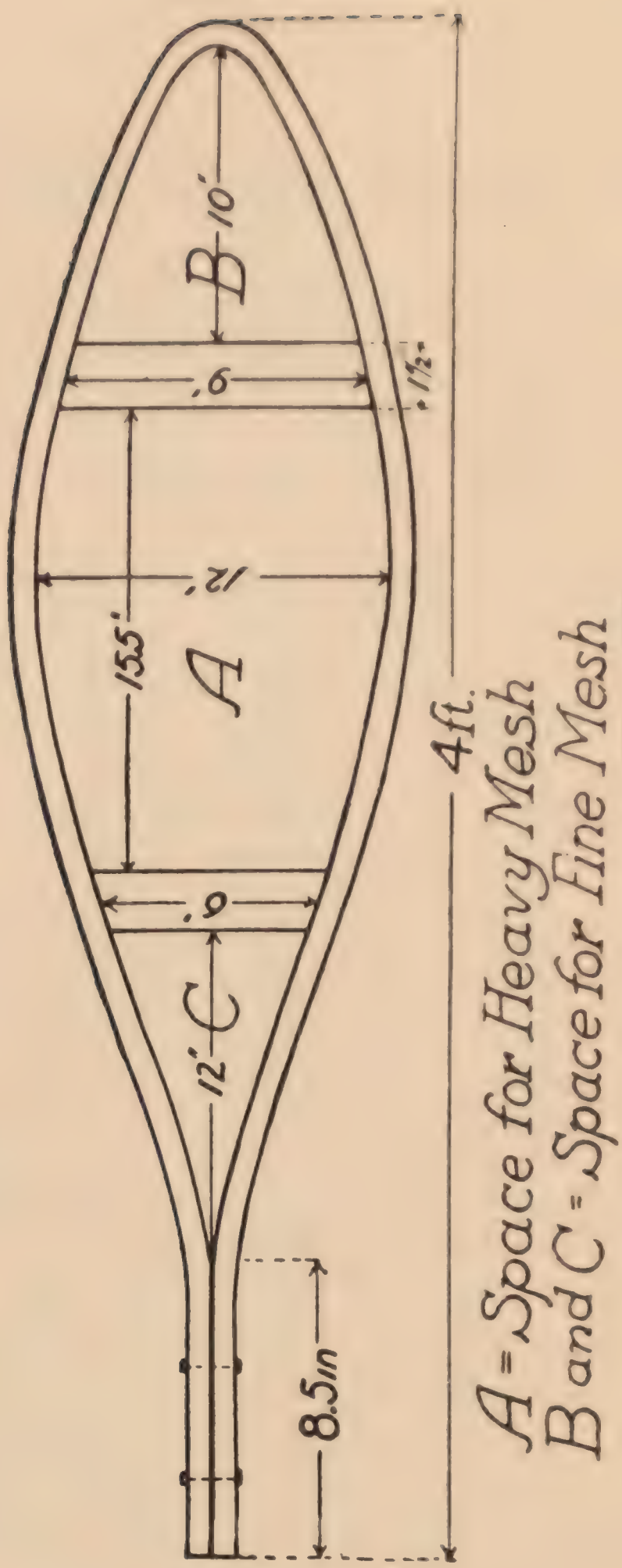
A = One inch holes for Clamps
Fig I

HOW TO MAKE SNOWSHOES

A pair of snow-shoes is within the reach of any person who is handy with tools, at a comparatively small expense.

The first step is to shape out of a half-inch board, of soft wood, a suitable form. Fig. 1 gives the shape and dimensions of a popular size of snow-shoe extensively used today.

From some convenient lumber dealer you can buy a ¾ inch strip of ash. The length of the strip should be 10 ft. and should be of straight grain th. entire length. It will be well to sand-paper this strip. Have the wooden form nailed to the work bench and a few iron clamps, such as boat builders use, will be found convenient to hold the ash strip on the form. The ash strip must be steamed until it becomes flexible enough to bend to fit the form, usually a half hour's steaming is sufficient. With the form in place the ash strip can be fitted to the form and held in position by iron clamps. Holes previously bored in wooden form will hold clamps. Of course strong rope can be used in place of clamps. The two ends of ash strip should be bound together and the whole allowed to set for two hours at least. While waiting, two strips of good straight-grained ash can be formed for the cross bars. These latter can be tapered down on ends to fit slots cut in the ash form. Fig. II gives the right distances to place these cross bars. It will be well to shellac the ends of cross bars to insure a tight fit in the slots in the frame. When the frame has set for about two hours it can be taken from the form, the cross bars fitted and the two ends riveted together.



A = Space for Heavy Mesh
B and C = Space for Fine Mesh
Fig II

From a harness maker or leather dealer rawhide strips can be bought and these should be soaked in water a day before they are used to weave mesh of snowshoe. In Fig. II spaces *C* and *B* can be filled with the smaller strips of rawhide and space *A* filled with the heavier strips. The reason for this is because nearly all your weight is supported by space *A*.

Fig. III shows a popular design of rawhide weaving. If you find this too complicated you can weave a simple design of your own. You will observe in Fig. III that the rawhide is wound about the frame in space *A* so that the frame should be smoothed with sandpaper to remove any sharp edges which might tend to cut the rawhide.

For spaces *C* and *B* holes are bored in the frame in pairs, through which the smaller rawhide strips can be woven. Care should be taken to bore as small and as few holes in the frame as possible to insure strength of frame.

For a shoe strap shown in Fig. V you can substitute a loop of rawhide to fit toe of your shoe with a second strip of rawhide to run from the loop on both sides and tie above the heel of shoe.

The usual type of shoe strap shown in Fig. V can be made by your local harness maker at comparatively small cost. In place of buckles over the toe some persons prefer rawhide lacing which can be adjusted to fit the foot.

Fig. IV shows pairs of holes in frame, the slots into which the cross bars are fitted. Space *S* in both Figs. IV and III are left to allow the toe of wearer to tip forward when shoe is lifted in walking. The shoe strap is usually tied to mesh with raw hide thongs so that the toe of wearer's shoe protrudes over the open space.

KIMBALL.

How to Use Snowshoes

To walk on snowshoes is not as easy as it looks. It

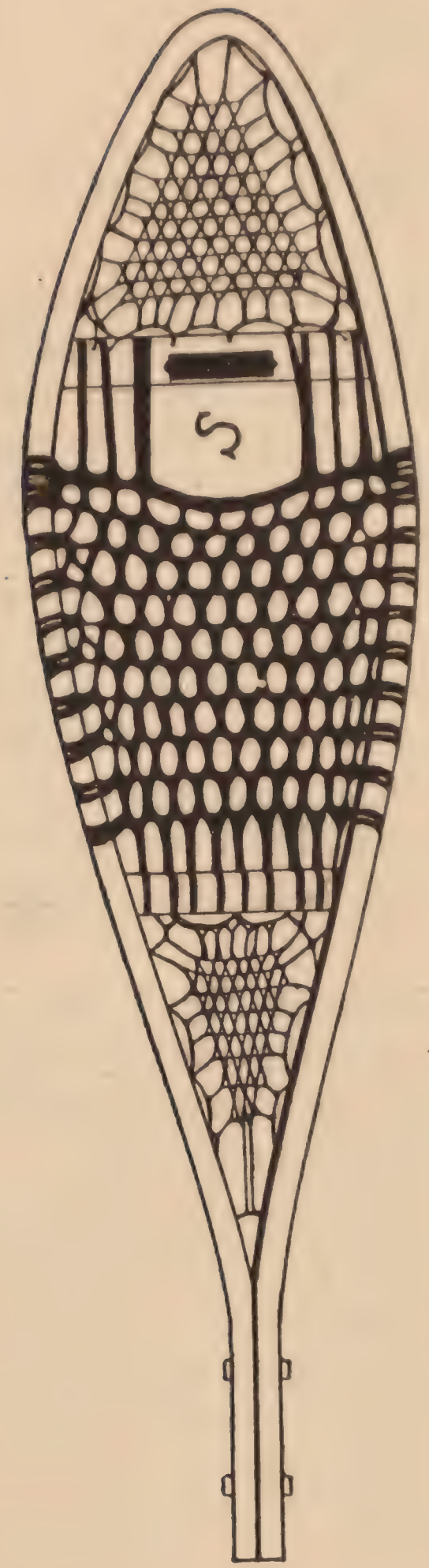


Fig III

Fig IV

appears to be a kind of glide, but the snowshoer can tell you that the motion is a long way from gliding. In ordinary street walking, the heel is but slightly elevated—is even lower than the toe at one point in the step; but with snowshoes the heel is brought high and retains considerable relative elevation while the whole leg is brought upward and thrown forward. Take the elevation of heel as the fundamental rule of correct snowshoe walking. Carried too low, the heel sinks the shoe-tail too deeply and makes walking very laborious. The heel is supposed to come down on the shoe only at the conclusion of the step, after the web is planted on the snow.

Correct balance (or maybe I ought to say lack of balance) in the snowshoe is essential to correct, easy walking. The tail should drag, even when you lift the front end quite high in stepping. A shoe that does not so act is not properly "balanced." It will tire you rapidly and cause many falls.

In some ways a curled up toe in the beginner's shoe helps him, but he is almost sure to prefer the flat, or approximately flat webs later, so he will make no mistake in beginning with them. He will not stumble so much with a curved toe, and the snow cannot accumulate on it so rapidly; but to offset these advantages, the shoe is comparatively stiff, and utterly useless when it comes to hill-climbing. It is bound to sink deeper in the snow than a flat pattern. In some parts of Canada they use an extremely curved shoe, often as much as eight inches, and I have it from a trapper who tried this pattern that they are extremely stiff and fatiguing. Further, such a toe often strikes the knee of the walker.

At first you may be annoyed at the packing of snow on the web, especially right under the foot. The closer the weave of filling the worse this will be; but the trouble can be lessened by painting the filling with hot mutton or venison tallow.

One expert snowshoer explained the smoothness of his stride by saying that he walked "with his hips." The beginner's inclination is to bend the knees more than necessary, knowing that half of the ascending shoe has to pass over half of the stationary one. Study to bend the knees no more than necessary, cultivate a free hip action, set the feet directly forward, and *keep the heel well up* in stepping—and you cannot avoid a good stride.

Of course you will get falls—many while learning, and an occasional one after mastering the trick. Learn to fall easily; sometimes one's efforts to save himself cause a wrench and strain. The snow is soft, and unless you twist yourself awkwardly a tumble won't harm you; it just adds to the fun. Use a staff on the hills; it will be of frequent assistance while learning. Walking on the webs is like some other sports, "a good game even if you lose." You may never become a champion at it; but you can't fail in securing some excellent exercise, a kind that strengthens important muscles and tones up every organ in the body.

Snowshoes demand reasonable care, if they are to last and give reliable service. As you doubtless know, it is injurious to the webs to dry them near the fire. Deer skin particularly, will not stand this. Dry them outside when the weather is favorable, and do it after every day's use.

Waterproof varnish will prevent the frames from becoming water soaked, but be sure the wood is perfectly dry at the time of application. I do not favor varnishing the filling, though I knew a sportsman who claimed excellent waterproofing results from coating it with gum shellac.

Breaks should be attended to immediately; always have extra strands of rawhide with you, and be sure that these have been thoroughly stretched. You must not jump with snowshoes; unlike skis, they will not stand much of this.

Be careful on rough ground, in crossing logs, etc.; throwing your weight on the shoe when one end of it is elevated on an unyielding object may break the frame—anyway, it will cause the shoe gradually to take on the undesirable rocker shape often seen. Don't "coast" in the webs; you will be tempted, when you find well-crusted snow on a hill, but such use quickly wears out the webbing.

Do not use a leather shoe on snowshoes. Hunting boots with heelless rubber bottoms are not bad; but moccasins are best of all—easiest on the feet and well adapted to the tying thong. I suggest the Chippewa moccasin, as its toe is particularly well shaped. For hosiery, use two or three pairs of lumbermen's woolen socks.

The size of the snowshoes chosen will depend mainly on the character of the ground to be covered; and naturally, the wearer's weight is a modifying factor. While there is an endless variety of shapes, shading into each other by easy gradations, snowshoes may be roughly classified into two types; the long, rangy shoe for straightaway walking and racing, and secondly, the stubby, almost round shoes used in hilly, rough or wooded country. The latter are the "bear paw" type, so named because of their similarity to Bruin's pads.

The looser and more powdery the snow the longer the shoe should be—that is, in open country. In the far North where the snow remains light, flaky and deep, the most serviceable shoe is about 60 by 12 inches. The "Algonquin" is the favorite in the eastern states. It is a decidedly broad type, approximately 38 by 16 inches, with rounded toe, hollowed a bit on the sides, and a long narrow heel.

Perhaps the best all-purpose shoe is about 48 by 14 inches, with close or open filling according as the snow is light or wet and "packy." It should be of the flat pattern, though our traveler should have had some preliminary practice with this type before attempting a long hike. The curled toe is usually preferred by the beginner, and when

Fig 1.

Fig 2.

Enlargement of the hitch at A.

the change is made to flat shoes—which ultimately are more satisfactory—a little time is required to get the stride. For all straight-away walking, as I have said, it is best to have the heel decidedly heavier than the toe. A broad toe with a narrow heel that cuts well down makes turning easier. Invariably the snowshoe that cuts down evenly at both ends is fatiguing, because it is hard to extricate from the snow.

EUBANKS.

Tying Snowshoes

Many a snowshoer would enjoy and appreciate his tramp much more if he could but find a way of tying on the shoes that would remain comfortable and require no attention throughout the trip. I know from sad experience that there is no more disagreeable task than that of tying and untying frozen strings in zero weather.

Here is a rig that should interest the tramper. With well-stretched strings, either deerskin one and a half inches in width, or broad woven lamp wick, which is easier to obtain, this lashing when once properly tied needs no further attention.

Also, the feet can be removed from the harness without any, or very little, assistance from the hands. Likewise, by reversing the operation the shoes are donned again without untying or tying the knots.

The sketch describes itself. The heel loop "B" when once adjusted to the length of the foot, is permanent. No toe strap is necessary, though some trampers use it in addition to the rest of the harness. I have found it uncomfortable on a long trip.

The thongs are crossed just back of the toes with a hitch as shown in Fig. 2, made by tying half of a square knot and then crossing the running ends. This hitch will not bind and can be shifted easily if found to bear uncomfortably on the foot. A half-hitch is taken about the heel

Fig 1
Fig 3.
Fig 2.

strap at the side and the ends brought back of the heel and knotted.

This rig is a native one, tested by time and long, strenuous trails, and experience has shown that for travel in the native's country the inventions of the aborigines can seldom be improved upon.

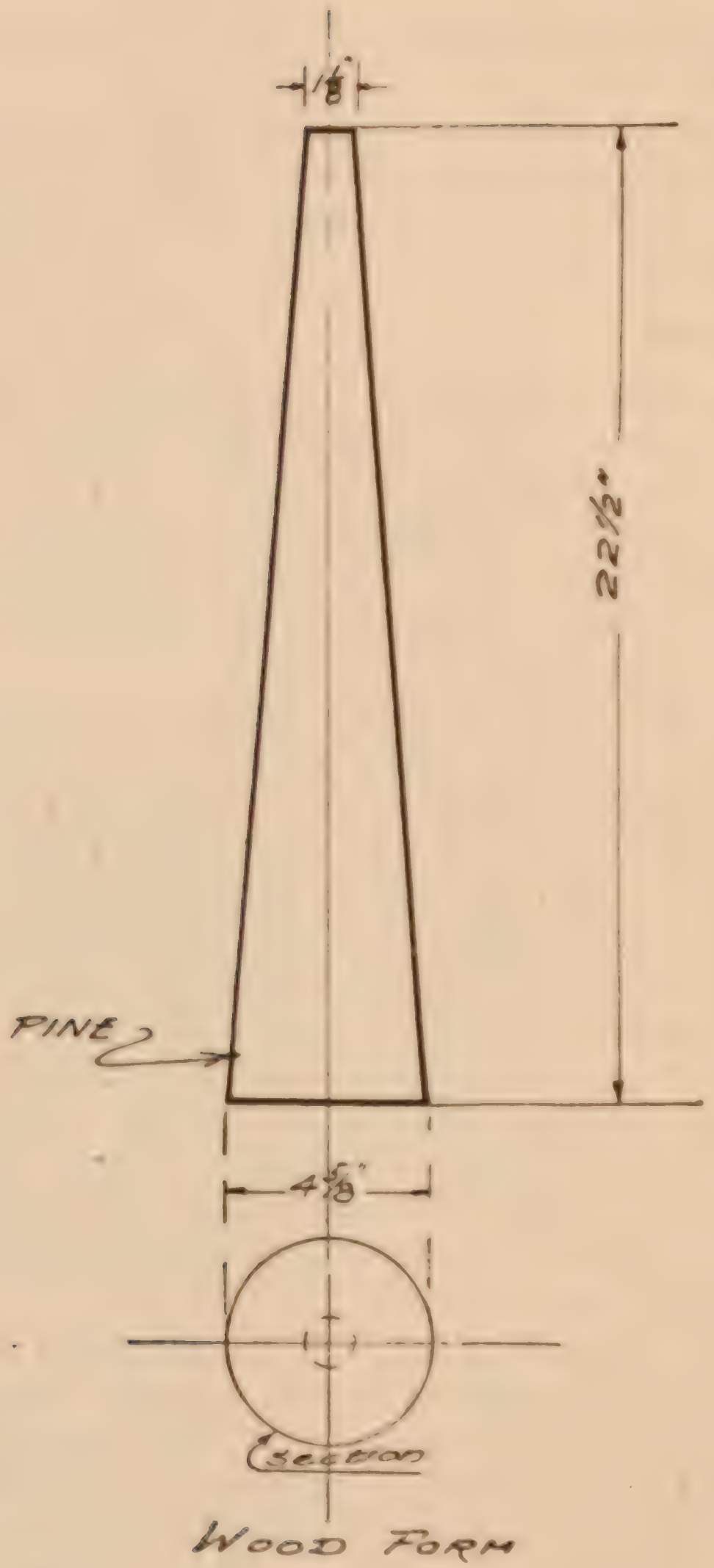
Duffle Sock

The "square duffle sock" is an article of foot clothing little seen south of the Canadian line. Blanket socks are quite common, slipper-like affairs sewn from blankets, that fit snugly inside of the moccasin and give ideal protection to the snowshoer's foot. Their fault lies in the fact that they wear through quickly where the ball of the foot bears on the cross string of the snowshoe.

When thus worn the sock's usefulness is ended and it goes into the discard. The square sock overcomes that fault. Each time that the foot is dressed the sock can be put on differently and all part wear equally, adding greatly to its term of life. For an average-sized foot a piece of blanket 18 inches square is about the proper size, but a few trials soon determine what gives the best resutts.

Adjust under the foot as shown in Fig. 1. Fold the corners "A" and "A" over the foot as in Fig. 2, and then underneath the foot again as in Fig. 3. You have thus two, and maybe three, if the sock is large, thicknesses where most needed. Fold the rest of the blanket snugly about toe and heel and draw an ordinary woolen sock, or the moccasin itself, over all.

The affair is not as bulky as the diagrams would lead one to suspect, though, of course, a larger moccasin than is usually worn is called for. A little experience soon gains for one the knack of making a near arrangement of the duffle, and surprising warmth, comfort and durability is obtained. For extreme cold weather and long days on the shoes I have worn two pairs of the square duffle in addition to two pairs of ordinary socks.


1/8"
22½"
PINE
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SECTION
WOOD FORM

Gauntlets

Another article of clothing for the winter outer that "can't be beaten is the deerskin gauntlet with its blanket or duffle lining. The latter is a separate mitt sewn to the leather one at the wrist only. The lining can be turned inside out and the whole affair easily dried.

The native wears his mitts on a knitted string, just as our mothers used to make us wear ours. If you have to handle gun and rifle in a hurry your mitts take care of themselves and are right with you when you want them again, dry and free from snow.

FRASER.

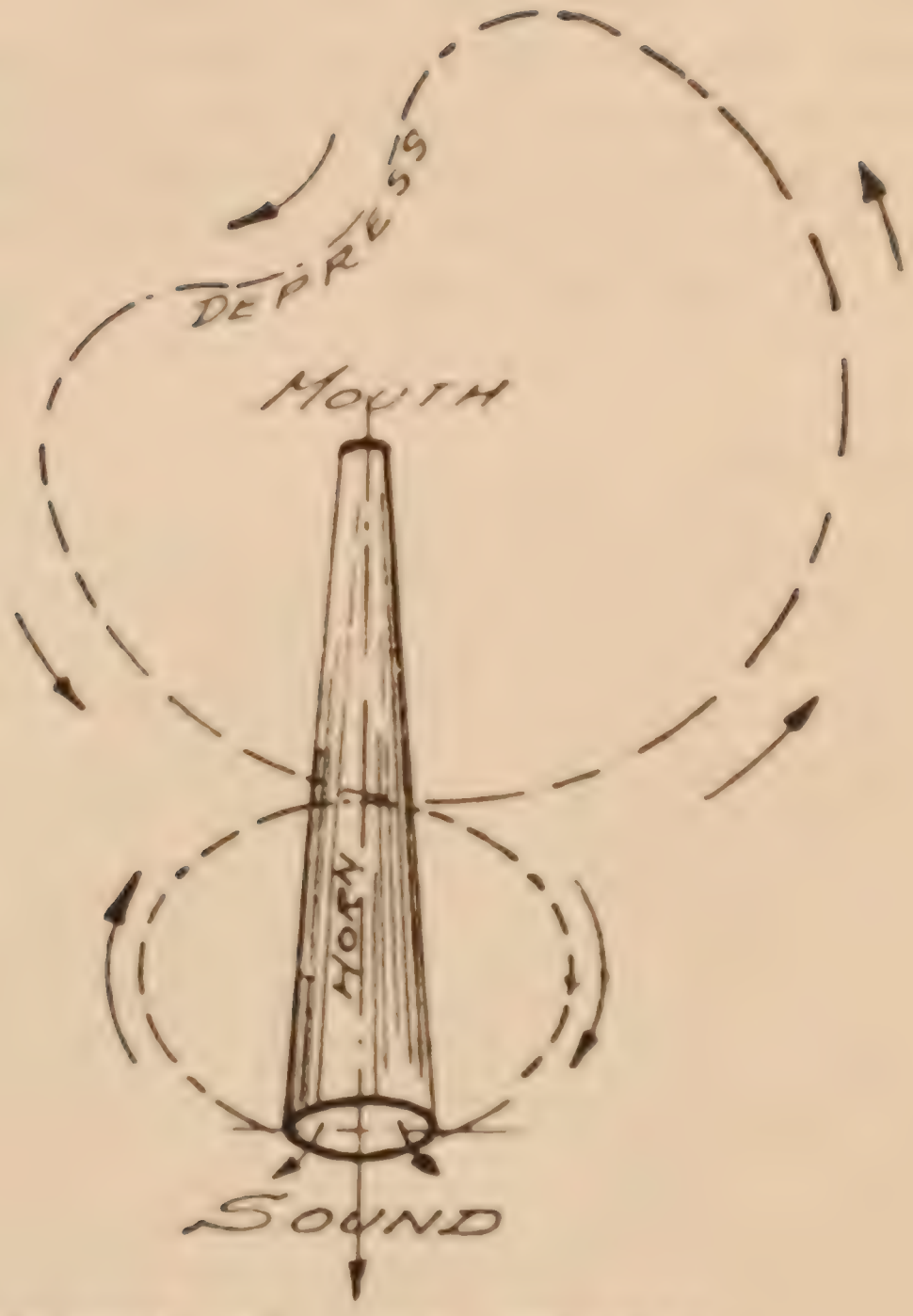
The Moose Call

To make a horn of birch bark about 4¾ inches diameter at the base and 1¼ inches at the mouth, similar to a megaphone, proceed as follows: First make a wooden form or cone, as shown in plan, 22½ inches long, 1⅛ inches at top and 4⅝ inches at base. Around this wrap good clear birch bark thoroughly soaked in warm water until very pliable. Have the thickness about ⅛ inch. Secure it to the form by twine wrapped about it and tightly knotted. When dry, remove from wood form and sew it up with regular shoe thread and awl, waxing the thread and making the ends secure. Square off the large and small ends and the horn is ready.

Much skill can be used in cut of bark and thickness, as it is as resonant as a violin when dry. Once the proper ring has been attained you will fell great pride in your craftsmanship.

To use the horn, proceed as follows: Breathe through it several times to dampen the inside; this makes the flow of sound smoother. Then inflate lungs full, several times; then take a good long breath and apply horn to lips, with the horn mouth pointing toward ground.

In making a call, a movement is described, as shown in the course drawing, similar to a figure eight. The



COURSE OF HORN
THROUCHOUT CALL

highest point coincides with the middle of the crescendo, and the movement finishes with the horn mouth pointed toward the ground.

The call should cover a period of 25 to 30 seconds. The caller bends his neck to conform to the course he describes, hence emitting the quavering inflection necessary, but which is hard to obtain by other methods. Wait three or four seconds and then call again, this time a little higher in scale; the greater volume being at the beginning and the pitch rising with the tone intensity—then wavering and dying away as before.

Throw a sort of longing and pathos into the voice until success is assured. Do not call too many times; after the first three calls wait about half an hour. After a third series of calls, and no results is obtained it may be considered useless to try the location any longer. A good plan is to practice by having a man go off a ways and when the calls are made he can detect the defects and make suggestions.

Carrier for Artificial Baits

At sundry times during my piscatorial past my ardor has led or misled me into designing and executing various contraptions of wierd conformation, hectic coloring and eccentric gait, devised to deceive, confuse or enrage the wily black bass and his voracious colleague, the pickerel. I derive especial delight out of casting my own home-brewed plugs. In fact, I must confess to having perpetrated a rather disgraceful series of submarine atrocities.

But the rub always comes: What shall be done with the array of plugs, spinners, wigglers and wobblers. For the most part they are poor mixers. It has always puzzled me as to just how to dispose of them conveniently for storing, showing to fellow enthusiasts, transporting or having them readily available for fishing. My favorite method of casting is to wade or to walk along shore if possible, using a boat no more than necessary, thus getting change of scene and much beneficial exercise. But how

carry the contraptions? They are always getting tangled up in something. Individual boxes are not very satisfactory. One cannot carry very many in his pockets, and if he does the bait he wants is always in the last box. Putting them all together in a box or bag is impracticable, as they will get hopelessly tangled up in next to no time. So what shall we do with them?

I purchased for about a dollar at a department store one of those flat rectangular bags which resemble a diminutive suit case, having a handle attached with rings, to which I snapped on a shoulder carrying strap. The inside length was 11 inches and the width 7 inches. The inside dimension from cover to bottom was 4¾ inches; about the length of an average casting bait. The next step was to cut some heavy cardboard into strips, each strip being of a width corresponding to the cover to bottom dimension of the bag, four strips corresponding in length to the inside length of the bag, and four strips corresponding to the inside width of the bag. These strips were cut, in the manner of egg crate partitions, with a series of cross cuts, each cut being as wide as the thickness of the strip and going to the mid line of the strip, there being four cuts on each one of the longer strips and four cuts on each one of the shorter strips. Be sure and have the strips wide enough to completely fill the depth of the bag from cover to bottom, otherwise there will be trouble. These strips were interlocked within the bag, forming a series of receptacles 1 2-5 x 2 1-5 inches by 4 3-4 inches in depth, each suitable for the reception of an average-sized casting bait resting on end. One or more larger receptacles can be made by cutting one or two of the strips completely across at one of the cross cut points. The fitting must be careful and strips of thin tin or sheet aluminum will make a more durable and satisfactory job.

This outfit can be conveniently slung under the arm and will easily provide a sufficient variety of baits for a day's fishing.

—*Reynolds.*

CAMPING AND WOODCRAFT

PLANTS AS GUIDES

There are few persons gifted with that inexplainable ability, sometimes termed the sixth sense, of accurately locating the proper directions when there are no familiar landmarks. Aids in locating directions are welcomed by lovers of the outdoors, and may frequently prove the means of saving life.

To those persons whom nature has not endowed with a reliable sense of direction a knowledge of the habits of plants may sometimes be of inestimable value. The Indian, we are told, was richly gifted with the ability to tell directions, but he frequently enlisted the aid of plants in assisting him through dense woods or over boundless plains. One of the plants whose habits prove valuable as an index for the woodsman is the lichen. These plants thrive on the barks of trees, growing usually in greatest abundance upon the north side. Although they are not infallible indicators, observation of the habits of these lichens will prove an aid in finding of one's direction. The writer recently had cause to be thankful for this knowledge when he was lost in the virgin hardwood forest of Grand Island, Michigan.

In case lichens are not present in sufficient abundance to act as a guide, common green moss may serve similar purposes. On exposed rock moss grows more luxuriously on the northern exposure than on the southern. The same phenomenon is true regarding the growth of moss on trees, since the richest display is usually found on the northern side. The explanation is simple. Mosses as a

Lichens usually grow in greatest abundance on the north side of a tree.

class thrive best in moist situations. Since the southern exposure of a tree receive the direct rays of the sun, it will be dryer than the northern exposure, which receives a minimum of sun-rays. The northern exposure is in consequence damper, thus accounting for the denser growth of moss. The trees on the edge of the forest will naturally be the best indices in this respect.

The fact that the southern side of a tree receives maximum sunlight, suggests another aid to finding one's direction. The greater amount of sunlight produces a heavier growth of branches and it is true that the longest branches and greatest leaf display are usually found on the southern side of a tree. Exceptions to this rule are found when the trees are exposed to prevailing winds; the densest foliage will then be produced on the lee side. Furthermore, old woodsmen tell us that the majority of the highest tree-tops are inclined to the southeast.

The strong sunlight from the south likewise has its effect on flowers in exposed situations. There are many species of plants whose flowers turn naturally toward the sun. A little observation on this point will soon acquaint one with the wild flowers which turn their heads toward the south in order to become exposed to the maximum amount of sun.

Another group of plants proving valuable as indices is that known as compass plants. There are two kinds, one growing commonly in the east and frequently known as wild lettuce, and another which reaches its greatest development on the plains and prairies of the west, from Michigan to North Dakota and southward.

Both the eastern and the western compass plants owe their value as guides to the fact that their leaves normally point north and south. The theories advanced for this remarkable phenomenon show the odd twists of minds of some of the earlier botanists. Thus we read that the polarity was caused by the magnetic influence on the resinous contents of the leaves, even though resin is a

Wild lettuce plant.

non-conductor. Again, the theory has been advanced that these leaves contain enough iron to render them susceptible to magnetic influences, although the iron content has been proved by the plant chemist to be insignificant.

The most tenable theory is that the leaves, which in addition to pointing north and south are also turned on edge, assume this position in order to obtain the full benefit of the morning and evening sun, and escape the hot blazing rays at noon-day. Science has proved that too powerful sunlight will decompose certain fluids within a leaf which are essential to the proper discharge of the leaf functions. It is probable that the compass plants are more sensitive to intense sunlight and have, therefore, adopted this device to escape the meridian sun.

The eastern compass plant is variously known as wild lettuce, prickly lettuce, milk thistle, or horse thistle, and is the plant from which our cultivated lettuce is supposed to have originated. It is an immigrant from Europe, but has become so perfectly naturalized here as to be known among farmers as a troublesome weed. The plant occurs frequently in fields and waste places, and probably can be found in every state in the union. The polarity is found only among plants growing in the open, and is lost in shady situations.

Dr. J. C. Arthur, of Purdue University, was the first to notice that when the common garden lettuce goes to flower it becomes a compass plant, as indicated by the stem leaves.

The western compass plant is one of the resin weeds, but due to its value as a guide it has earned the appelation of pilot plant, polar plant and compass plant. It forms a frequent and interesting sight upon our prairies from Ohio to South Dakota, and as far south as Alabama; its large, bright yellow flowers are a welcome relief on the otherwise monotonous prairie landscape. The deeply cut lower leaves, especially on young plants, point north and south, assuming a vertical position in so doing. Many of

the pioneers who blazed the trail of civilization into the Great West were directed across the vast prairies by this useful plant. Longfellow in his immortal epic, "Evangeline," extolled the virtues of this faithful guide when he wrote:

"Look at this delicate plant that lifts its head from the meadow,
See how its leaves all point to the north, as true as the magnet;
It is the Compass-flower, that the finger of God has suspended
Here on its fragile stalk, to direct the traveller's journey,
Over the sea-like, pathless, limitless waste of the desert."

The poet here conveys the impression that the plant is delicate, although the pilot plant is really a robust, coarse weed. Some writers have cast doubt on the reliability of the pilot plant as an indicator. The close observations of the writer on many hundreds of young plants on our western prairies verify the fact of its reliability as a guide. It is interesting to note that the term "shadowless forests of Australia" has its origin in the fact that the leaves of the eucalyptus and acacia trees, the commonest members of the Australian forest flora, turn their edges to the sun at midday; hence little shadow is cast at that time.

Probably there are other plants in addition to the ones here described, which may be found useful as compass plants. Certainly this knowledge may sometimes become exceedingly valuable. Although exceptions to the instances cited are common, a combination of observations on plant growth should soon enable one to get his bearings.

—*Hansen.*

The Mechanics of Camping

Much of the comfort of camping depends upon the camper's knowledge of elementary mechanics.

Give a man all the camping equipment on the market and the most desirable camping ground imaginable and if he lacks mechanical sense he's bound to suffer some discomforts. The chances are, he'll return disgruntled, sore in body and spirit and an enemy to the outdoor life ever after.

By this I do not mean that he must be a mechanic—not at all. I do mean, however, that an understanding of the simple rudiments of mechanics—their uses in the great outdoors and an appreciation of their possibilities will be an asset not measurable in money.

We will consider the camp site. It is the foundation of a good camp and therefore the most important item. What are the essential points to consider that smack of the mechanical? Well, to begin with: water runs downhill, so to avoid waking up in a mud puddle some dark, stormy night, see that you pitch your camp on an elevation that, taking into consideration the topography of the surrounding country, will insure you a dry camp. When travelling through level, low country, commence well before sunset to pick out the camp site. Don't wait until the last minute and take a chance of spending a night of torture in a soggy bed, just because darkness forced you to stop at the point where it overtook you.

Other mechanical attributes of a good site would be natural protection from prevailing winds, if you intend the camp for a permanent one, and plenty of morning sunshine to dry out the camp and its bedding. Avoid low valleys and ravines because of the possibilities of freshets which might leave you stranded on a square yard or so of land before you could pack up and escape. Remember, also, that cold air, fog and mists always settle to the bottom and consequently make such places damp.

In cold weather try to pitch camp in the lee of a large rock. This for two reasons First: the rock will act as a probable wind-break. Second: it acts as a natural reflector and will tend to reflect the heat from the camp-

fire back into the tent or shack: a boon on cold nights and to rheumatic bones.

If camping on a hillside, try to settle below a natural rise of ground, rocks or clump of trees. Just as air passes over the edge of an airplane wing and leaves a bank of quiet air below it, so will winds, sweeping down the hillside, jump any natural barrier to pass over the camp and leave it in warmer and quieter air.

Avoid pitching camp near dead trees or on hillsides where slides are liable to occur during rains. Trees may fall and sliding stones can do more damage in a minute that a broadside of heavy artillery.

A few years ago, advice regarding pitching a tent might have been necessary but with several million men just out of army training, there will undoubtedly be someone in the party to captain the enterprise. Someone with many weary hours of real "honest to goodness" tent pitching to his credit. But here are a few kinks to remember.

Nine persons out of ten drive tent pins the wrong way; head away from the tent. Instead—drive them slightly slanted towards the tent and fully a foot deep. The reason for this is that when driven pointing away from the tent, the pull of the ropes is at right angles to the peg and the pulling leverage at it's greatest. By pegging the other way the pull is more indirect and there is less danger of the peg working the surrounding earth loose.

If tent pegs are cut from green wood, the points can be hardened by charring them in the fire. If the ground is wet or very sandy, so the pegs will not hold, dig a hole where each peg should go and tying the tent rope about a rock or bundle of brush, lay it in the hole and cover it up. Tramp the earth down over it and you will have a very suitable substitute for a tent peg. Another way to secure tent pegs driven in sandy soil is to lay a large rock over each peg, having previously driven them at an angle in the soil.

Volumes might be written about the camp-fire and not

exhaust all the possibilities of the subject, but, laying aside a discussion of woods, winds and general fire-building directions, which every good camper understands, there are several points that are helpful and well to emphasize.

Remember that to make a fire in wet weather is a test for the camper's skill, but by recalling the mechanical nature of storms it can be made easy. Dry fuel, tinder and a suitable spot to build a fire can usually be found under large rocks, overhanging trees and logs or in the interior of stumps which are exposed to the lee of the wind. Rains will seldom penetrate those places unless driven by counter winds.

Split up this dry stuff very fine and start the fire in the shelter of a rock or *green* tree and nurse it along slowly. If necessary, shelter it with a blanket raised on two sticks.

To light a match in the wind—face the wind and hold the match head down in the cupped hands, head pointing toward the direction of the wind. The suction caused by the wind drawing through the opened hand to the rear will cause the flame to run up the stick.

If you have no matches but do have a cartridge, a fire can be started by drawing the bullet, pouring out most of the powder upon a dry piece of rag and then putting the cartridge back into the gun, fire it towards the cloth on the ground which will be ignited. If the cloth is moistened with a few drops of inflammable oil, it will help. This should be done where tinder is handy so the fire can be started from the burning cloth immediately.

Other mechanical means of striking fire during sunny weather are as follows: Take off the lens from your camera, field glasses or telescope and focus the rays upon dry tinder. If such lenses are not to be had use your watch crystal partly filled with water in the same way. The last resort, in cold weather, is to shape a piece of clear ice like a lens and use it as a substitute. In lieu of any handy tinder, rub cigar ashes into cloth or paper. Gun powder, if it can be spared, will do even better.

The forest vise.

When building a fire, remember that *air* is just as important and necessary as fuel. Air should always be allowed to enter from the bottom of the fuel so as to draw through the mass and escape at the top.

A few mechanical kinks which will assist materially in lightening labor about the camp will be found convenient, such as the following:

Whetstones are heavy to tote around so here's a good substitute. Take a piece of thin wood about 10 in. long and 2 in. wide and shape one end like a handle. Then glue a strip of coarse emery cloth on one side and a piece of smooth or fine cloth on the other. This can be carried in the coat pocket without making you round-shouldered.

If you are going into a wild country carry a compass, but be sure to take off the crystal before starting out and mark "N" on the end of the needles pointing North. This may seem unnecessary, but a man is apt to lose his head unaccountably when lost and follow the South end of the needle. This marking will obviate any such occurrence.

One of the prime necessities about a well-ordered camp is a good axe. But—here's the point—never leave it lying on the ground when not in use. Always drive it in the chopping-block—deep. This will prevent it from rusting from ground dampness. Also it will keep it where no one can accidentally be cut by it. This is important. Doctors are scarce in most camps and first-aid none too sure.

A good vise can be made by cutting down a good-sized sapling, leaving a stump about 4 ft. high and splitting it down through the middle for about 2 ft. Then lash a strong rope around the stump about half way up the split and insert a strong stick under the rope which can be twisted like a tourniquet. Open the split with a wedge and insert the article to be held. Then, by twisting up the rope, it will be clamped as securely as in any vise.

A pair of sun goggles, necessary for those with weak eyes when on water, snow or in open spaces, can be made of two disks of thin wood similar in shape to the lenses

of regular spectacles. Cut two narrow slits in the center of each disk, crossing at right angles. Provide a strap for the nose and bows for the ears. If possible, replace the lenses in an old pair of spectacles with others, cut, as described, of cardboard, birch bark or thin wood. Such spectacles provide perfect vision, keep free from moisture, and do not give the sensation of darkness, as do smoked glasses, after being removed.

An efficient method of ridding a painful insect wound of the injected poison is to force the open end of some small tube such as an empty cartridge, hollow key, etc., against the flesh around the wound for a few minutes. This will force out the poison to the surface where it can be wiped away.

Temporary splints for holding together broken bones until surgical aid can be summoned can be made out of material at hand. The best natural splint is made by using the bark of a tree as near the diameter of the broken limb as possible. Strip the bark in two separate pieces somewhat longer than the broken bone. Fill the hollow side of each piece of bark with soft material such as moss, grass, etc. Then arrange one piece each side of the break and bind loosely with a long piece of cloth or rope.

Other materials for emergency splints are split staves, bundles of brush and rushes and even light sticks bound completely around the limb. Pad them to ease the wound as much as possible.

Water can be boiled without a kettle. Here is the gist of it:

Take a thin sheet of birch bark and make a trough-shaped bucket. Pin or sew the folds with green twigs below the water-line. Pour in the water and set the bucket upon the coals also piling them about it.

Snow can be melted in the same bucket by setting the bucket in the snow before the fire. Slant several little sticks, each supporting a snowball at the top so they rest over the edge of the bucket Then let the snowballs melt

into the bucket until it is filled sufficiently. After that set the bucket in the fire.

Another way to boil water is to hollow out a green log, fill with water, and bring to a boil by dropping in red-hot stones as required.

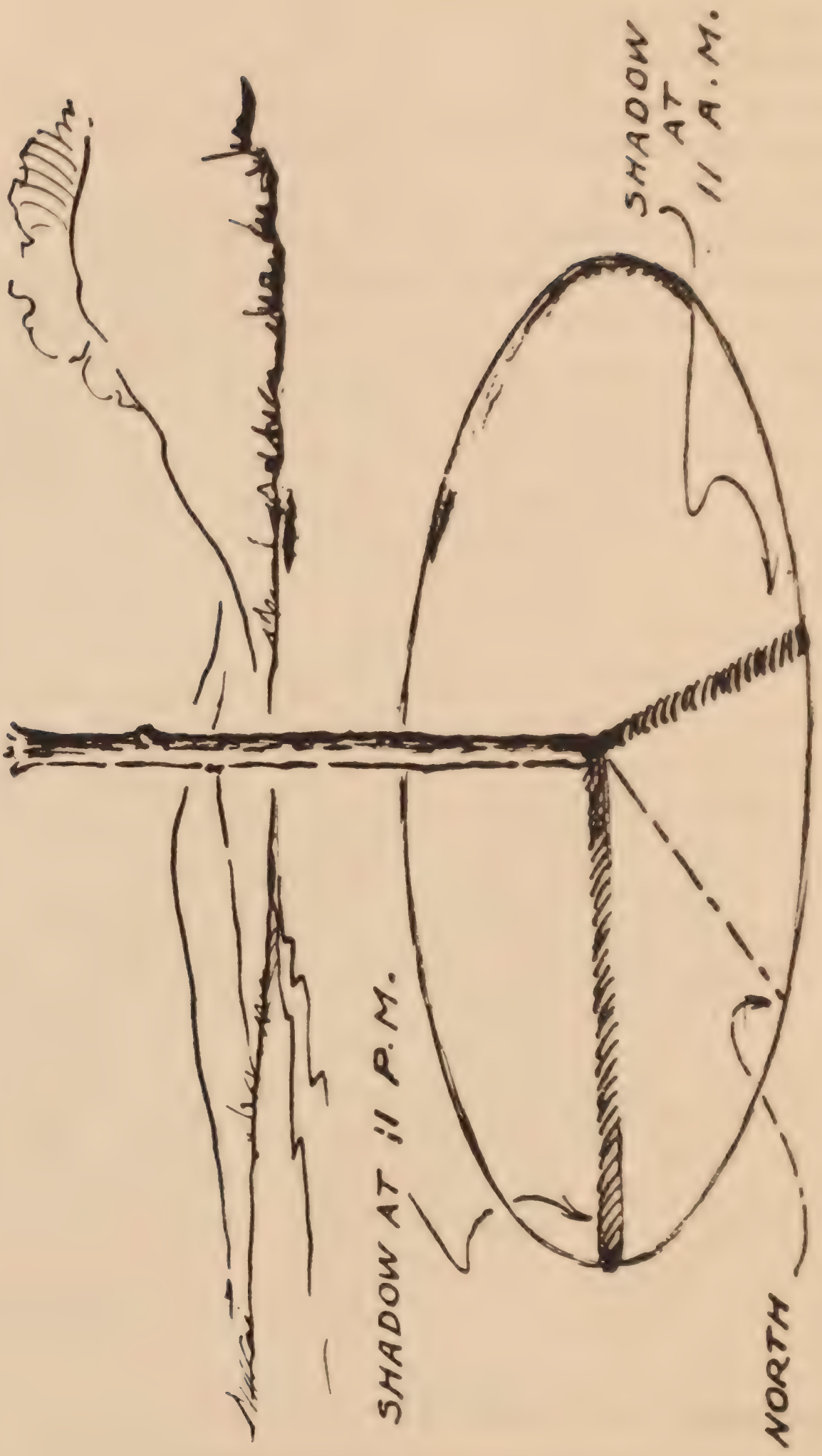
If you find yourself without a compass here is a method of finding the meridian that will serve to get you out of almost any difficulty. Drive a stake in the center of a smooth, level piece of ground. Get it vertical by pluming it with your knife suspended from a piece of string. Do this about an hour before noon, standard time, and make a mark at the end of the shadow of the stick. Then inscribe a circle about the stick, using its base as the pivotal point. Its circumference should just touch the mark at the end of the shadow. Then at one o'clock make a mark where the shadow touches the circle at another point. Then make a mark upon the circle just half way between these two former marks, and connect it to the pivot point with a line. This line represents nearly the true meridian. Where it cuts the circle is *North*.

One might go on indefinitely enumerating various mechanical kinks and twists of knowledge that would lighten the worries and labors of camp life. However, much will have to be left to the mechanical sense of the camper himself to ease his own way. But it is hoped that this will help him to see how much mechanics enter into the routine of camp life and that he will realize that without mechanical laws and their "sure fire" attendant results, life in the great outdoors would indeed be more of a gamble than it is.

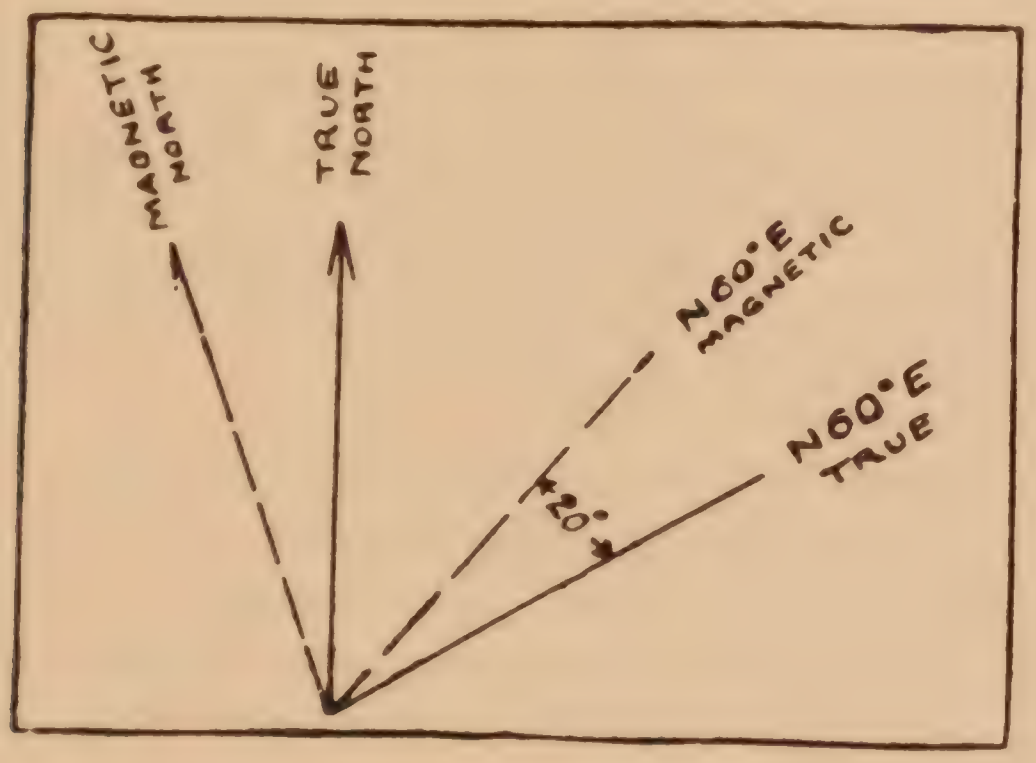
L. B. ROBBINS

Correcting the Compass

Everybody knows that a compass and map are valuable for helping the lost camper to get his bearings. But how many amateur outers are able to use the compass with accuracy for such purposes?


SHADOW AT 11 A.M.
SHADOW AT 11 P.M.
NORTH

Some sort of map of his outing area should be carried by every sportsman. And the first thing he should do if he feels himself getting lost is to orient himself on the map by observing the topography, drainage and other natural features shown on it. Having approximately determined his position on the map, he should draw a line from this point to the nearest familiar locality, and observe what angle this line makes with the north line on the map.



Let us say that it runs 60 degrees east of north. Then by walking N 60 degrees E he would arrive eventually at the familiar locality. But here is just where many people make a mistake.

If the compass needle pointed true north (towards the geographic north pole) it would be an easy matter to determine the direction of N 60 degrees E. But unfortunately it does not point true north (with negligible exceptions). It points to the magnetic north pole, which lies to the west of north for eastern States and to the east of north for the western States. The declination may be from 0 to 26 degrees, depending on the locality.

To determine the exact declination in a given locality, you can procure a map showing magnetic declinations for the United States from the Government Printing Office, Washington, D. C., for a few cents. Having once looked up the number of degrees declination for your locality, it is easy to remember and apply it.

In northern Maine the needle points 20 degrees west of true north, and since good maps are usually plotted true north, it behooves the lost camper to apply the correction. For example, let us say you wish to go in the direction N 60 degrees E (true reading) and the magnetic declination is 20 degrees west. Then your compass needle points 20 degrees west of north in your region, and so you must add the 20 degree correction to your N 60 degrees E and get N 80 degrees E. If you walk N 80 degrees E, you will be walking along the line which on your map reads N 60 degrees E (true reading).

The accompanying sketch will help you figure it out.

And remember that 20 degrees makes all the difference in the world on a long hike. For example, in a distance of as little as five miles, the error would bring you nearly two miles from your intended destination in Maine.

How to Make Jerky

In these days of the growing scarcity of wild life there is one phase of the preservation of game animals which to the writer's knowledge has been somewhat overlooked. Preserve the life of the creature as well as possible but when it has been taken the next important step is to preserve the meat or to make it possible to use every edible part of the animal.

There is perhaps not a sportsman but who is acquainted with the term jerky, though I doubt if more than a few know how to prepare it, especially so as to make it palatable for the home table.

Thousands of deer are killed every season and thou-

sands of pounds of their carcasses are left in the woods to appease the appetities of the carnivorous element or to rot, as the case may be. Usually the head is taken as a trophy, and a part of the animal is consumed in camp, perhaps one hind quarter and the tenderloins; the rest is left for want of an available means of preserving it until cold storage is reached.

In most instances the game is found too far from a shipping point to make it convenient to bring home the entire carcass in a fresh state, hence the desirability of curing the excess meat in camp to eat at leisure during the winter months. To have venison out of season is a rare and unusual dish, and a little time spent in camp will provide many enjoyable dinners at home. A baked jerky pot pie in January (when the law keeps our rifles at home) is a most satisfying and delicious treat; helps out on the H. C. L. and breaks the monotony of the tiring domestic varieties.

Jerky is made in a number of ways. Some tribes of Indians cut the meat in strips and hang it from poles to dry in the sun; a method that serves the purpose of the semi-civilized but as can be judged, not the most sanitary. It is subject to flies and other unwholesome elements of the air.

The Apaches smoke it over a smoldering fire, and I have seen quantities of venison hanging over cedar poles curing in this manner. Some mountaineers sprinkle the strips with pepper to keep the flies from attacking the meat while in its fresh state, then hang it from the cross beams of their cabins, but like the crude method of the Utes, cleanliness is in a measure disregarded, while at the same time the pepper makes it too much of a Mexican dish to suit the tastes of the more fastidious.

As a result of the foregoing and some other unsatisfactory methods of making jerky, which I have witnessed and practised, the following recipe is the most practical and satisfactory one I have learned of; gained by ob-

servance of the Apaches' better way of curing meat in the wilderness:

A green wood frame, 3 feet high, can be erected in a few minutes without nails or other hardware if neither is at hand. A spool of nickled wire is not essential, but makes the job easy and swift. The meat is cut in strips, averaging about eight inches long and one inch thick; each piece is first rolled in a pan of salt—not rubbed in, but just sufficiently so as to cover the surface lightly. Place each piece of meat in a bucket or other convenient receptacle as salted; by the time the last piece is treated in this manner, a brine has formed with the contents so that each and every piece of meat is entirely fly-proof, as well as cured to the first degree of the process. A fire having been started under the frame so as to produce a generous bed of coals covering the entire space within the frame is now ready to turn the fresh meat into jerky. String the meat on the wires (cut to fit the frame) and stretched across tight. When the meat has thus been placed the last procedure is to place a few green limbs of aspens or other deciduous trees on the hot coals. This will produce the required heat and smoke and if properly cared for will not permit the blaze to mount higher than about 12 inches, which should be retained for about ten hours, according to atmospheric conditions. The cured meat can then be put into canvas bags or other convenient retainers.

TRAINING THE BIRD DOG

The charm and success of field sports depends so directly upon the work of the intelligent and well-behaved bird dog that it is easy to understand the attention that has for many years been devoted to the breeding and training of setters and pointers. In the last half century a series of competitions, known as field trials, have enjoyed an extraordinary vogue both here and abroad and have markedly influenced the breeding of bird dogs. These trials undoubtedly have been of some benefit, but it cannot be well denied that they have rendered some strains of bird dog well nigh useless for the everyday sportsman who, while admiring style and dash and other highly developed qualities, is more keenly interested in the bird dog which will locate the elusive snipe, penetrate the coverts of the woodcock, search the fields for cheerful Bob White and serve as a useful assistant to the gun.

We purpose to write of the sportsman's dog, sometimes termed by professional handlers the "meat dog," as distinguished from the field trial dog which occupies so much space in the sporting magazine. Just when and where the term meat dog originated we are unable to say but we do know that it has occupied a prominent position in the lexicon of field trial handlers ever since a man named Tom Pace and a dog named Prince Whitestone won the championship at Grand Junction, Tenn.

Tom Pace was a rangy built man who lived in the Cumberland mountains. He mined coal for a living and went quail hunting for recreation, or to be more exact, mined coal so that he could go bird hunting. His own review of the situation was that he was "a plum fool over

Here they are.

bird dogs and bird huntin' and when he wasn't bird huntin' he was readin' about bird dogs and dog races." Prince was his favorite dog, which he had raised from a pup and trained and Prince had "just naturally cleaned up every dog that he had met in the field." The zest of local conquests had dulled upon Tom Pace but the sporting magazines continually whetted his appetite for other fields to conquer; so one day Mr. Pace bought a mackintosh coat, whistled to Old Prince, laid in a supply of mountain grown tobacco, boarded the accommodation train, and the next evening was working edgewise into the biggest dog talk that he had ever heard, for he was at a big field trial meeting over in Illinois, hobnobbing with millionaires, smoking cigars with bandages, and making some headway into the exclusive circle of professional handlers. It may be said that professional handlers at a field trial develop temperamental qualities that register from haughty reserve to sympathetic toleration, depending largely upon the positions that their dogs occupy in the scale of competitions. They were the men, however, that Mr. Pace really looked up to, for he had read columns about them in the paper. Meanwhile, Old Prince slept peacefully in one corner of the room.

There was no temperament about Tom Pace and his dog Prince; in fact we doubt if either would have known what temperament was outside of the feed lot. The fact that they were not thought worthy of consideration in what the morrow's racing might bring forth was no fault of his, for he announced he was over there to win the trials or find out if there was a dog in the world that could beat old Prince and personally he did not believe that there was.

That night Old Prince shared his master's room. In the morning he breakfasted on what was left of ham and eggs, grits and a double order of wheat cakes, and instead of riding out to the grounds wrapped in a blanket, in a special constructed dog wagon, he simply trotted along-

side the buggy that the mountaineer had negotiated for with the liveryman the night before.

There is no necessity of going into the details of that field trial day other than to say that there never was a sadder bunch of handlers than those that drifted into the hotel dining rooms that evening. The mountain dog had cleaned them so clean that there wasn't a good kick in the outfit. Tom Pace and Prince and the prize money took the night train for the hills, and it was not until after the little red lights in the rear of the train had glimmered down the tracks and faded away into the darkness that there was a revival of spirits. The next morning there was some talk about a "fluke race," "fields too small," "conditions not right and it could not have been done at Grand Junction."

The following January the first man to greet the handlers when they untrained at Grand Junction, Tenn., was Tom Pace, Old Prince and the mackintosh coat, and to make a short story of a long week, the old dog beat them again on the historic field where Championship races have been won and lost for nearly half a century. He outbirded Champion Jessie Rodfields, Count Gladstone, the greatest bird dog of his day, and on the breakways looked back at Lanark Lad, the fastest dog of the season. He won the championship cup and when the time came for him to go home some one congratulated Tom Pace on having such a magnificent field trial dog. He readjusted his tobacco, took another hitch at the mackintosh and replied, "Mister, you have made a mistake. I can't stay here any longer because my wife has written that the children are crying for Old Prince, but he ain't no field trial dog. He is a meat dog." The definition was promptly adopted.

Prince Whitestone was a meat dog. Handlers to-day refer to him as a meat dog, but he beat all the best field trial dogs of the day, as they had never been beaten before.

There have been many attempts made to tell the difference between a class field trial dog and a meat dog. One

of the clearest definitions is that a class dog hurries on into the next field to find birds while the meat dog finds those nearest to him. This also explains why so many sportsmen prefer meat dogs to field trial dogs. At this time it may just as well be said that a meat dog can be just as well bred, just as good to look at in action or in repose, and just as handsome and stylish on point as a field trial dog. It is possible also to get a meat dog out of the same litter of puppies that produces a field trial dog, for bringing up, education and experience are the principal differences between the two.

It is written down in the books that a dog is guided by instinct, that he does not possess reasoning power. Never was there a greater fallacy. It is one of those old errors that one generation hands down and another generation accepts. The dog is an animal with a high degree of reasoning powers, so high it is difficult to place boundaries upon the possibilities of its intelligence, and it is their remarkable capacity for appreciating and combining facts that enables them in a few short years to acquire a knowledge of the habits and nature of game sufficient to outwit the cunningest bird by superior tactics.

The average bird dog, either pointer or setter, with a fair amount of experience soon learns to follow a trail till the bird flushes or lies to point; but it requires a higher order of intellect to prompt the dog voluntarily to head a running bird so as to get it between himself and the gun.

The mind of the intelligent bird dog never rests. It is adding to its store of knowledge with each new experience and preparing itself to meet the emergencies that are constantly developing. We are perfectly willing to concede all that modern field trials have done for modern dogs. They have developed their instinctive qualities but unfortunately they have not only neglected their intellectual qualities but have actually placed a premium upon their suppression.

The field trial world subscribes unqualifiedly to the theory that the mental qualities of the dog are simply instinctive, that reasoning powers are not to be encouraged, therefore instinctive searching qualities "sans" reason or intelligence mark the field trial dog. The field trial dog above all must go, race, keep going, take a chance of getting lost, ignore its handler, forget that it has a handler, get lost, but keep going—all of this is class.

The intelligence that prompts a dog to search likely fields carefully, to develop the faint scent floating on the breeze, to follow a running bird with the delicate tactics that will force it to lie or the prompt manœuver that places the bird between the dog and the sportsman, has no place in the curriculum of the field trial dog.

There are two instincts recognized by field trials and it is by the display of these instincts that races are won and lost; one is the instinct to range fast and unceasingly, the other is to point stylishly, yes, dramatically!

The purely intellectual qualities are not considered worthy of consideration, and how can they be, for the entire field trial system is based upon the fundamental error that the dog is an instinctive and not a reasoning animal.

We will leave the field trial dog to field trial men and write only for those who want an intelligent companion on the fields.

Training Benefits

I am thoroughly convinced, after an extensive experience,—wrote one of America's leading sportsmen—that ninety-nine men out of each hundred can, with a little instruction, break their own dogs well, and that they will really take more satisfaction with them, both while in training and afterwards, than they can with even the most perfectly broken animals, which, from being associated with and handled by another person, must ever be

to their owners ready-made articles, and not the work of their own.

In cases where the sportsman breaks his own dogs, he wins from them an attachment which I doubt if he ever gains in any other way. I think it is an undeniable fact that a dog ever afterwards likes best to hunt the birds he is broken on, and upon the same principle his affection goes forth to the person who initiates him into the pleasures of the field. The reason may be found in the fact that a dog is an intelligent, impressionable creature, so first lessons, first sympathies and first love are never eradicated, but remain in their fullest strength centered round the memory of the original prompter. No two men work and handle dogs exactly alike, so that though the words of command may be used the dog hunts differently for different men. It may also be said that it requires but a short time to change a dog's attachment, and that he soon transfers his regard from an old master.

There is also another benefit. It lies in the fact that the sportsman advances in knowledge of his craft as his dog progresses in his instruction. In order to break well, a man must study his dog that he may apply the incentives of reward or punishment in just such a degree as the dog will bear, without either rendering him too eager to receive the one or breaking his spirit by the other. By this study of the animal the sportsman really educates himself, and consequently finds that after breaking one dog he has comparatively little trouble with any he may undertake thereafter; thus he becomes independent of professional assistance while at the same time he enjoys a rare pleasure, for next to watching the development of the human mind there is no more fascinating pursuit than the training of a high-couraged, intelligent dog. Only those who have experienced it can appreciate the pleasure of seeing the faculties unfold under instruction while the affectionate instincts prompt the pupil to do his best and to delight in the approval of his teacher.

Self Control

There will follow brief and simple directions by which any man may undertake to break a dog with a certainty of success, provided he will keep ever in mind the watchwords of the art: Observation, patience and perseverance. I took my initiatory lessons from one whom I have never yet seen surpassed in his control over dogs, and found that the secret of his success lay in his rare control over himself. Every year since has impressed upon me two facts; first, that without self-control no man can ever break a dog well; and again, that no set of rules, no matter how carefully they may be arranged, will apply to all dogs. It is the power of comprehending and adapting himself to different natures that makes one man a much better breaker than another; therefore, the first point is to study and thoroughly understand the pupil before beginning the real work of breaking.

Though the same rules will not apply to all cases, the same order of instruction may be observed, and I believe that which I shall now propose to be the best for practical use. Undeniably it is easier to train an intelligent pup six or eight months old than one two years' old with confirmed will and habits; but even this may be accomplished if the instructor is gifted with perfect patience, and will adapt himself to the character of his dog. In nature the animal is like a child, possessed of a certain degree of reasoning power and as readily recognizing a friend and master. Some dogs need to be encouraged. The obstinacy of others require long effort to overcome. Some need severity, and here the sharpest is the most merciful because less liable to need repetition.

Selecting a Puppy

Select your dog from a superior stock, since a stupid, thick-headed brute, or one that does not take to hunting readily, will not pay you for the time and trouble you will have to give him. Give him his lessons when you are

alone, and if possible, in a room, since he is there always under your control, a fact which he soon learns to appreciate. Never attempt to teach him a new thing till the previous lesson has been thoroughly learned, or he will confound the two and become discouraged in consequence.

Here, at the beginning of these lessons in dog training, we wish to impress upon the sportsman who is undertaking the development of a useful bird dog the very important fact that no bird dog is born into the world with a knowledge of its affairs. He inherits from his ancestors certain instincts but no knowledge; the latter must all be acquired by experience. The streets, the fields, the forests and the streams and all the living creatures are to him strangers to be sure. They excite his curiosity just as they excite that of a child; but curiosity is not knowledge. Your dog can learn only by experience; at first he may be either bold or timid, reckless or cautious. Take him with you to your business or your office so that he can see that side of life, and when he is four or five months old let him follow you into the fields. Do not expect him to know about things in advance and do not be disappointed is he is confused and alarmed, but let him learn about things by exploring them. Remember also that he can not understand a flow of words and if you talk too much you will confuse and alarm him when you are attempting to encourage him. Do not distract his mind from problems he will solve himself if left alone. In fact, the young dog should be treated like a young child. In showing him what that you want him to do you can use words and signs but be sure they are simple and not repeated too often or too loudly; and above all things, do not forget that a six months' old puppy has a very simple, undeveloped brain and it is absurd to expect more of a six months' puppy than you would of a six year old child. Time, patience, repeated opportunity and experience will ever be the basis of the trainers' art.

Early lesson in retrieving.

Retrieving

We will now suppose the pupil to be six months old, healthy, happy, and with the experience we have mentioned; further than that he does not know anything. His first lesson should be given in an empty barn, loft or room, where he can move about. Snap a light cord to his collar, let him go, and when he begins to play say, "Come in!" If he does not come at once, give the cord a twitch and pull him in to you firmly hand over hand, then pet him until he has entirely recovered from his fright. When he minds instantly you will have made an important step in his training, for you have taught him to recognize you as his master and to come when he is called. This may not be accomplished in one lesson but after he understands and obeys with reasonable promptness you can advance to the second lesson, which is retrieving. This accomplishment is sometimes taught by throwing a ball for the dog to run after; it works well in some cases, but it takes more time than the method now presented and in the end is not so effective. With the throwing the ball method, all depends upon the inclination of the pupil; if so disposed he will go after and bring it, but there is no way of compelling him to do so, and in this (as in everything else) the dog should perform an action because ordered to do so; in other words, expect his will to be subservient to your own, so that he will do as directed without consulting his own convenience or inclination. With the ball it is mere play, but by this method it is real work; and though it has its rewards and may be made a pleasure, it still has a tendency to teach the animal that he is under control and that it is not optional whether he will retrieve or not.

The first thing the dog should be taught is to sit up and deliver into hand, and to hold an article until taken from him. To inculcate this lesson, call the dog in front of you; say, "Sit up!" If, as is probable, he does not understand, take him by the collar under the throat with

one hand so as to hold his head up, and passing the other arm around his hind legs above the hocks, force him into a sitting position, but be careful to do this quietly and gently so that he will not be frightened. When he becomes accustomed to the position and will take it readily at the word, take a newspaper and fold it into a flat, tight fold of about four inches long, then with the dog in position before you, open his mouth by pressing the fingers against the back part of his lips so as to force them between his teeth. Place the paper in his mouth, closing the jaws, and saying "Pick up!" Retain it by holding one hand under his chin for a few seconds, then take it out and by petting the dog let him see that you are pleased with him.

Should he attempt to turn the paper, or to open and shut his jaws upon it, check him at once by a light tap under the jaw and the word "Careful!" The folded paper is preferred to any other object because the dog is less likely to bite or turn it, and from becoming accustomed to holding it quietly and steadily he will be more likely to turn out a tender-mouthed retriever. When the dog holds up well, take a few steps, allowing him to follow you with the paper in his mouth, and if he attempts to drop it, place your hand under his jaw as you walk, and at every attempt to eject the paper lift his head quickly, with a sharp "Careful!" He will soon learn to follow you and carry the paper, which will confirm him in holding it, and teach him also to carry well, a thing which many dogs will not do, even though they may fetch.

Picking Up

The second part in the retrieving lessons it to teach him to pick up from the ground. You want now something that will attract the dog's attention as it lies on the ground. The best thing is a cleanly-scraped bone. First let the dog smell of it as he sits in front of you, take him by the jaw so as to hold his head up, and drop the

bone at your feet; naturally he will try to stoop for it; restrain him for an instant, then let go and say "Pick up!" If he minds you, all right; if not, take the bone in your hand and give it to him as you did the paper, repeating the command. After giving the bone once or twice at the usual elevation, drop your hand toward the floor, and tell him to "Pick up!"; if he refuses, push his head down, open his jaws as at first, and make him take the bone and hold it up. Continue in this way till he will take from your hand anywhere, or pick up the bone from the floor. If, on the contrary, he picks it up at the first order, do not let him run away but order him at once to "Sit up!" and take the bone from him. It is well to have a cracker or bit of something he especially likes to reward him for the loss of his bone. Never give him the bone but confer some more choice reward, so that he will learn that there is a greater pleasure in the surrender than in the keeping. After working him close to you until perfect, throw the bone farther and increase this till he will bring from any distance, either in the room or yard. Work him now on all kinds of light things—a bunch of keys, a knife, or a small bottle; but be sure not to give him anything heavy; if you desire a tender-mouthed dog.

Never permit your dog to refuse to pick up anything you order, even though you are compelled to spend hours in forcing him to obey. Be thorough in the first lessons, and you will have less trouble farther on. Remember, however, that the only way to make a reliable retriever is to teach him that your will is his law; but do not order your dog to pick up things which can in any way hurt his mouth or attempt to show him off to your friends by commanding him to do unnecessary things

Down

It is now time to teach your pupil to drop at command and remain in this position until ordered up. Call your pupil to you, say "Down!" and then by gently pressing

on his back proceed to force him to the ground in an easy position with fore legs extended, but at first do not insist upon his nose being between his paws. Keep him down a short time and then after saying "Up!" let him rise to his feet.

A fault some trainers make is to allow the dog to face you when down; be sure that he is perfect in dropping in other positions, otherwise he may acquire the habit of turning toward you before dropping, This you will find a difficult matter to correct, therefore always teach a dog to drop first by your side. consequently facing away from you.

Practice this, working until your dog will drop readily, then walk a few steps and say "Down!" If he does not drop, press him down as before, and work him till he will obey perfectly at a distance as well as when near to you. Now make him drop facing you, and saying "Close!" put his nose down between his paws and keep it there. Work him till he will drop at "Down!" and at "Close!" put his nose down. Be sure to make him understand that he must not lift his nose till the word "Up!" is given. The object of this is that in the field ordinarily there is no occasion for the dog to put his nose down; and in hot weather it is uncomfortable for him to do so as it interferes with his panting; but in case you wish to crawl for a flock of ducks the "Close!" is very useful, as the birds might take alarm at an uplifted head. In teaching the "close" make the dog drop facing you, so that you can watch his eye and detect an inclination to raise his head. and check him before he gets his head up. Years ago in the days of muzzle loaders the final point in dropping was to shoot a gun with light loads, and teach him to "down" until he would drop at the report without waiting for the word. This is no longer considered necessary.

Work your dog frequently on dropping until he appreciates the importance of obeying promptly. If your dog has a habit of turning toward you before dropping, quietly

take him by the collar and place him in the proper position, and after keeping him there a few moments let him arise, repeat this lesson every day until he ceases to commit the fault.

Heeling Up

If these lessons have been carefully taught your pupil now is ready to be taken into the fields where you next will teach him to come to heel. The best way to do this is to attach a cord to his collar and lead him along with your hand held behind your back, carry a light switch in the other hand, and as you walk along tap the dog lightly on the nose whenever he attempts to forge ahead, and say "Heel!" Repeat this command whenever he attempts to pass you. Make him stay in his place till you say "Go on!" Do not allow him to stop on the road, or to play with other dogs, but teach him to follow closely and promptly.

For the different lessons only verbal commands have been given, and in fact they are all that is necessary. They can, if desired, be combined with motions accompanying each order so that the dog will learn them and render words unnecessary. For those who desire to go to this trouble, the following motions are used: With the "Come in!" beckon as if to a person; to go forward swing the hand forward, the arm hanging at full length; to heel would be the reverse of go on; "Drop" should be accompanied by a downward wave of the hand, and "Close" with the finger pointing toward the ground. When your dog does not quarter his ground well, or you wish to send him across a stream or into a thicket, whistle to attract his attention and then wave the right or left hand, according to the direction you wish him to take. Work him thoroughly on these orders and signals, and never give a command without its corresponding motion, and in a short time the dog will obey the hand as well as the voice. This constitutes the refinement of dog training, as it

Spaniel feathering on game.

practically precludes the necessity for verbal orders, avoids alarming wild game, and is a great improvement on calling at the top of your lungs to a dog on the further side of a field.

Field Work

Having taught these lessons until your dog understands them perfectly and obeys the various commands promptly and willingly, we may consider his yard breaking accomplished, so that at the opening of the season he is ready to enter upon regular field work with the gun. You must not forget that when he first goes afield all will be new to him, therefore do not be hasty or prone to consider the mistakes he will make deliberate wrongs deserving of punishment. Remember also, that while being yard broken he had no excitement to contend with, other than that comon to high courage and youthful spirits. but now everything is different. If he is slow about learning, be patient. If he enters into his work with so much zest as to be unmindful of your orders again be patient.

Whenever you go out with a young dog carry your check cord, and if he is inclined to be wild, for the first few times carry an iron pin about 12 inches long, the upper end bent into a ring to which you can fasten the cord. Watch your dog closely as you go along and if you see him about to commit a fault, try to anticipate it and check him. Be cool and quiet with him. Take plenty of time and go to some place where you are sure to find birds. As soon as your pupil strikes their scent, get to him, and in a low, soothing voice say "Steady!" Above all, act yourself as if you were cautious about advancing; this will impress him more than words. The dog is so imitative that, seeing his master careful, he becomes so himself. Should the scent excite him so that he will not obey you and he threatens to spring on the birds, fasten the cord to his collar and compel him to heed your voice

by a few sharp jerks. If you can get him to stand his first bird a long step in the right direction will have been made.

Pointing

Encourage him to work out every trail no matter how faint, rather than leave it too quickly and when at least he comes to a point, get to him, snap the cord to his collar, and now is your opportunity to make your dog staunch. His future will depend in a great measure on how you handle him now; stroke him gently from head to foot and make him stand as long as possible without tiring; then push your iron pin into the ground, or take a turn of the cord round a small tree to prevent the dog getting away from you if he breaks shot. Start the bird yourself, and be sure to kill it; better miss a dozen birds later than the first one your dog points. Should the excitement prove too much for the dog and he attempts to rush in upon the fallen bird, the cord will bring him up, and just at the instant it tightens on him you should cry "Down!" The jerk and the command will probably bring him to his senses and he will drop at once; but in either case promptly drag him back to the place where he should have stood and make him drop there for a few moments, whether he has broken shot or not, it will serve to make him steady under fire; then advance with him to the bird and make him point it.

Pick up the first bird you kill over a young dog, even though he is a good retriever; let him smell it in your hand for a few seconds, patting him and showing him that you are pleased; then throw the bird a few paces and encourage the dog to advance and bring it at once. This is almost sure to make a dog eager to bring, but should he dislike to take the bird in his mounth, open his jaws, put the bird in, and holding his mouth shut lead him gently back to where you stood, then make him sit up and deliver it, rewarding him with pleasant words and caresses. Proceed in this way till the dog understands this part of the

work and does it well; then all he will need will be experience to make a perfect land retriever.

—*Pious Jeems*

TRAINING THE BEAGLE

The merry beagle and the timorous rabbit contribute more healthy sport to the lives of sportsmen, both as men and boys, than any other animal within the realms of the out-of-doors. Although the rabbit is regarded by some sportsmen as a quarry worthy only of boys or the happy-go-hit hunter who is out for the day with an unquenchable love for noise and action, the fact remains that no living animal is more adept at all the arts of concealment or is more skillful in eluding its pursuers than the common rabbit of our fields and woodlands. Its protective coloration for every season of the year and under all conditions is as nearly perfect as nature has conferred upon any of its wild creatures. Its sense of sight and smell and hearing are all wonderfully acute. Its body odor is but slight and its footprints leave only the minimum of the tell-tale scent that marks the way for beagle and hound; and as for the intelligence of this timorous creature, it may be safely said that the wisest old deer or the wiliest moose has not at his command the repertoire of tricks in the way of concealment and the art of dodging and covering his trail that the ordinary buck rabbit, who has reached the age of discretion, is capable of pulling upon half a dozen hounds and hunters any November afternoon, when the crisp of winter is in the air and the shadows are lengthening in the corn fields.

The beagle is essentially a hunting-dog and to-day occupies a position on full parity with the setter and the pointer. Interest in him is growing steadily, for those who love the music of the hounds and enjoy the excitement of the chase have learned that a pack of well-trained beagles will furnish a good day's sport for even the seasoned fox hunter. For these merry little hounds

The winning combination.

have good tongues and when hunting rabbits, the music they make equals that of a pack of fox hounds.

Up to within a comparatively recent period, it has usually been believed that the training of a beagle could be left pretty well to the dog itself and all that was necessary to do was to take him afield with some older dogs or allow him to exercise and develop the adeptness for the chase that he has inherited from his ancestors.

There is a right way and a wrong way of hunting with the beagle and it is safe to say that many beagles do not hunt as they should, due largely to the fact that they have been allowed to train themselves and no attempt has been made to develop their good qualities or restrain those peculiarities which were wrong.

Before undertaking the training of a beagle, it is well to consider what is to be expected of the individual dog as well as from the pack. Each hound in a well-trained pack should go out and search for a rabbit just as though he was the only beagle hunting. With each beagle in the pack searching the brush piles, the hedge rows and the likely places, the greatest possible efficiency will be obtained. A beagle working independently learns by experience to know the character of the country and the most likely places in which to jump a rabbit or search for a trail. He learns also to know the character of the trail as soon as he strikes it and does not deceive the other dogs by giving a false note. When he does strike a good working trail he gives tongue and the other dogs, knowing the quality of his notes, run to him, and each, working independently, helps to work out the trail. Once it is straightened out all go away in a pack, not merely running to a few leads, but each being ready and able to take up the trail alone.

Working independently does not mean that the dogs are not to run to each other when a trail has been found. On the contrary, it means they are to work alone until a reliable note is sounded, then they all run to the dog which

A good run.

gives tongue on the trail. But no really good beagle waits until another dog gives tongue. He keeps searching until one does open.

In order to make each dog in a pack work as he should work, it is necessary in the first place to train each beagle separately. That is, each hound should be trained alone and be permitted to hunt with one or more hounds only as it seems to be necessary to do so for his particular benefit. When he has learned to rely thoroughly upon himself and will pay little or no attention to another beagle working with him, he may be worked with a small pack and eventually he will work well with any number of hounds under all conditions.

In training the beagle the first idea to inculcate thoroughly is to have him follow the rabbit and avoid the habit of merely running trails. Therefore it is a good plan, when taking a beagle first to field, to encourage him to run the rabbit by sight. If the rabbit is put down in the open and the beagle allowed to go after him, he will not bother to nose the trail so long as he can keep the rabbit in view, and when he first loses sight of him he will be certain to run on at top speed until he loses the trail.

What is desired at this time is to get the young hound in the way of sticking close to the rabbit, and to keep him from dwelling on the scent. Short, sharp runs while he is fresh are what is calculated to get him into the habit of going as he should go, and during these short runs he will not be likely to fall into the bad habits that a tired or discouraged beagle picks up.

When a young beagle will follow well by sight and then pick up the trail and rush on after the rabbit without dwelling or pottering on the scent, he may be given a few lessons in starting a rabbit.

That is hard work for the handler, as it will be necessary for him to tramp from one likely spot to another in an effort to kick out a rabbit. Do not attempt to keep

Bunny and Pat.

the young dog with you too closely at this time. He should be permitted to run about as he pleases. However, he will be likely to follow the trainer and pick up some notion of the kind of places likely to hold rabbits. Should a rabbit be started the pupil may be put on the trail and permitted to follow it in his own way so long as he keeps going on the trail. When he is at a loss he should be taken up and worked so as to hit the trail in another place. If no success is had at this, the dog should be taken up and away from the locality entirely.

Once the young beagle gets the idea of searching for rabbits instead of rabbit trails he will not waste time pottering about on unlikely ground, but will hunt the likely places and enjoy starting the rabbit, picking up the hot trail and following it.

After a young hound has had some experience in the field and has learned how to search for a rabbit or to follow a trail, there still remains the danger that if he is put down with an older dog the superiority will be so apparent to the young hound that it will tend to make him lean on the older dog, rather than rely on himself. This tends to injure his independence, something that the trainer should always seek to develop. For that reason it is well to take him out the first few times with poorer dogs, for it makes him bolder and better if he is working with dogs he can beat.

When two hounds have been trained in this manner singly they may be worked together; then they may be worked with others, and finally a pack of half a dozen or more may be worked together.

A pack of six beagles trained in this way will work independently at starting rabbits and then work together once the rabbit has been started.

In a pack of six beagles trained as herein directed there is likely to be one that is a little timid, lacking confidence in himself and showing a disposition to rely on the other dogs. Such a beagle should be kept out of the pack for a

time and be given plenty of work alone, or with a young beagle which could not do better work. When he becomes self-reliant he may be put into the pack again.

Every beagle in the pack should be thoroughly independent, and so far as possible they should be selected with reference to their speed. A pack made up of fast and slow dogs is not a desirable hunting pack. Better have six slow dogs of even pace than to have some fast and some slow.

A well-trained, even running pack of beagles is more difficult to obtain than one might suppose. To get such a pack a great deal of training and selecting is necessary. The pleasure such a pack affords is worth the time and pains it takes to mould the pack into the thing desired.

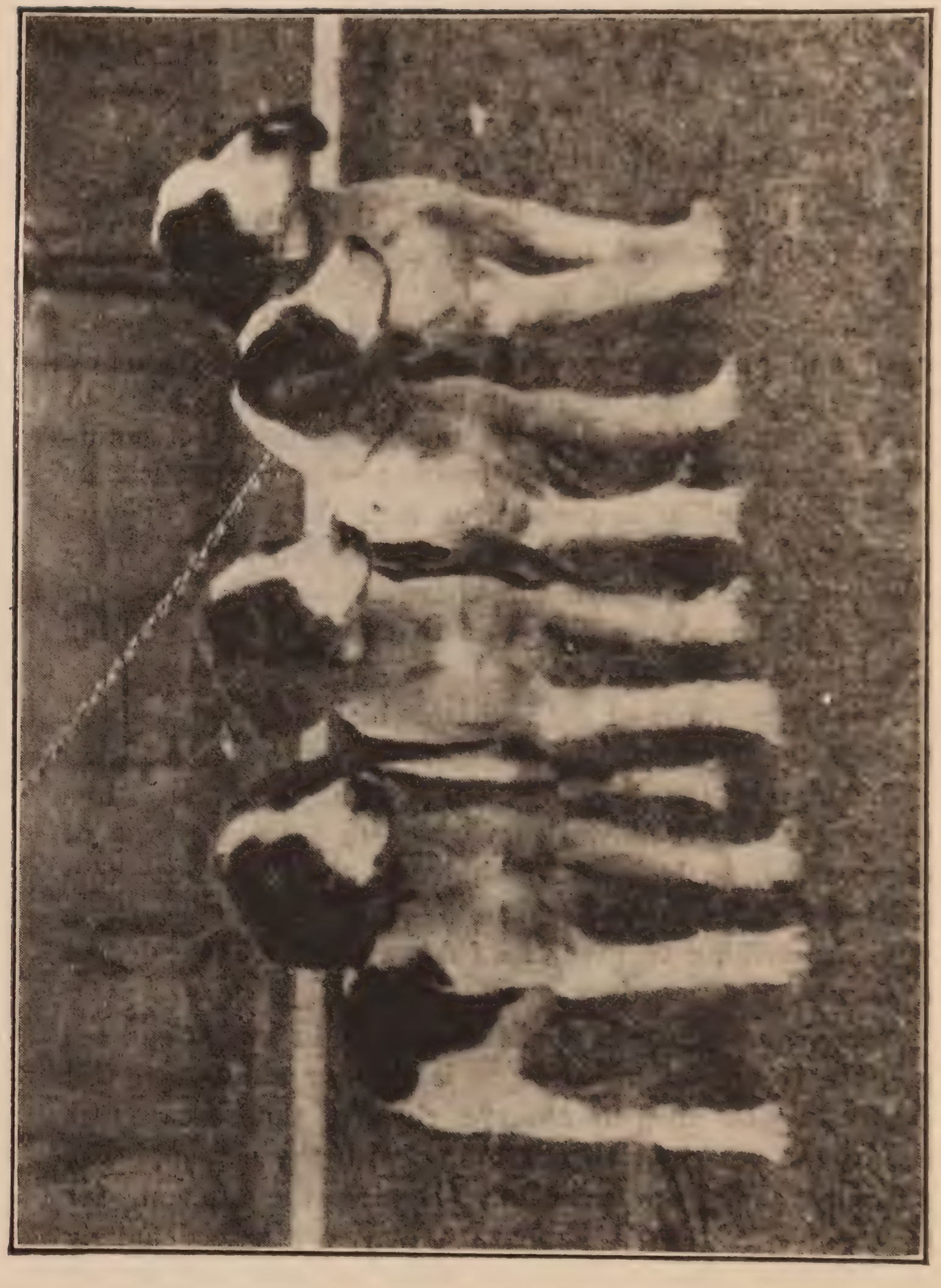
In preparing a beagle for the hunting season, too much importance can hardly be attached to condition. No dog can go fast or stay long if compelled to carry a load of superfluous dog meat with him, and yet it will not do to starve him down to the right thing. He must have a sufficient quantity of the right kind of food and be brought down to running trim by hard work, and this work must be in a rabbit country, where he can acquire actual experience on game at the same time he is hardening his muscles and reducing flesh.

DISEASES OF THE DOG

The ability to successfully treat the various diseases of dogs is measured largely by one's skill in diagnosis and the accuracy with which they recognize various ailments, for once the disease is known the means for treatment and prevention are written so plainly in so many books that "he who runs may read." It is this ability to differentiate between diseases that constitute the genius of medicine, and those who desire to acquire proficiency must first familiarize themselves with the habits, appearances and functions of animals in health, so that they can promptly recognize the changes that take place in disease and read the processes that are going on within the patient's system.

It is the purpose of the articles which follow to present in concise and simple language the appearance of the dog in health and the symptoms which evidence disease, this to serve as a groundwork on which to build a system of observation, analysis and elimination that—in connection with the various chapters on disease—will enable those who are willing to give the subject a reasonable degree of study to treat dogs successfully.

The owner who has studied his dogs in health can tell at once if one of his charges is sick or ailing and will frequently be able to observe changes that escape the eye of the veterinarian unfamiliar with the patient. The difficulty comes in accurately defining the ailment, for to treat a dog in a haphazard way, without definitely locating the disease, is worse than no treatment at all. It is the cruelty of ignorance.



A promising group of foxhound puppies.

In Health

All dogs do not present the same natural standard of health. In general, however, the healthy dog presents the following appearence: The nose, when awake, is cold, moist and slippery; asleep it can be hot and dry without indicating disease. The tongue is free from coating, moist and pale pink in color. The eyes are bright, the white clear, and there is no significance to the fine red lines which thread the surface. The coat of long-haired dogs should be glossy, of short-haired dogs smooth and full of life. The pulse is full and strong, usually somewhat irregular, varying in different breeds and natures, and running from eighty to one hundred beats. The urine should be freely voided and of pale yellowish color.

Disease is usually defined as a change from the state of health. Diseases are divided into those of rapid action, known as acute, and those of slower action and longer duration, known as sub-acute, the latter, if long-continued, being referred to as chronic. A disease may then be either acute, sub-acute or chronic. The same attack may also pass through all of these stages. It is acute when it comes on so suddenly and severely as to incapacitate the victim. In the sub-acute form the symptoms are not so severe. The chronic form is one that has persisted for a considerable length of time at a low degree of intensity, that only partially incapacitates. The patient being considered as simply ailing.

Symptoms

The symptoms commonly presented by an acute attack of disease are as follows: The patient has an anxious countenance and the attack is often ushered in by a well-marked chill, during which there will be a considerable degree of temparature registered by the thermometer, while the body will feel cold. The nose will be hot and dry. The eyes are reddened, thirst is excessive, appetite wholly or partially lost; lips and tongue dry; the stomach

disturbed, slime and mucus being vomited. Usually the bowels are constipated, although in some cases there is diarrhoea; the urine is scanty and high colored. The body, even during a short attack, appears sunken and the flanks are tucked up. The head is often carried peculiarly and the animal by its looks and actions pleads for relief.

The owner of a sick dog whose ailment is not readily apparent should take precautions to see that his patient is not disturbed and should quietly observe his ailing charge for some time. In all probability he will see something that will assist him in forming an opinion. The patient should also be given a careful physical examination. Examine the mouth and throat for bones or cuts, run the hand carefully along the throat for obstructions and over the chest down the back and loin, and carefully examine each leg for heat or pain. The abdomen should also be examined, so that any swelling bruises, injury or abnormality may be detected.

It may be stated also that dogs are not as susceptible to pain as man, and diseases like peritonitis, colic and intestinal obstructions are borne with no greater symptoms of distress than evinced by getting up from time to time, walking about slowly and again lying down. There are, of course, notable exceptions to this insensibility. Some dogs, usually house pets, or those which have been closely inbred, are so sensitive to pain that the slightest injury will throw them into a nervous state bordering on hysteria.

The Coat

The coat is a most reliable indicator of the health of an animal and never fails to reflect a loss of tone and condition. In health the coat is smooth, glossy and lies well. If the coat is harsh and staring, a disease is present or may soon be expected; in fact the coat registers the most trifling changes in condition. A lack of

drinking water, indigestion, intestinal parasites and all disorders of the system, particularly those which go with the processes of nutrition, all sound their first warning note through the condition of the coat.

The Skin

In a state of health the skin is soft, smooth, elastic, and slips easily over the muscles and tissues it covers. On the inside of the thighs it is pleasantly warm and dry, without being hot. In disease the skin is hard and and does not yield easily to the presure or manipulation of the hand. A cold, clammy skin, with a feeble pulse indicates great depression of the vital powers, while icy cold ears and legs are signs of sinking. The color of the skin also changes with disease. In jaundice and liver troubles it takes on a distinct yellowish tinge. If the blood is poor and nutrition defective it becomes paler than normal, and in advanced pneumonia, when the lungs are not taking in sufficient air to properly oxygenate the blood, the skin turns purple or blackish.

The Tongue

In health the tongue is a delicate pink color, soft and moist, changes in its appearance indicate an unhealthy condition of the digestive organs and in a way the entire system. A dry tongue or one covered with whitish saliva indicates excitement of the circulation. In acute attacks all of the tongue will be colored; in chronic cases only in spots. A pasty white coating and darkish red color indicate that the digestive track is out of order. In case of malnutrition and poverty of the blood the tongue becomes pale. In cases of arsenical poisoning or whenever the stomach has been much irritated and inflamed, the tongue is brighter red and more swollen than normal. In bad cases of distemper or following any long-continued fever the tongue becomes dark brown or almost black. In rabies the tongue usually is larger than normal, swollen, dry, hard and purplish black in color.

The clearing up of the tongue is a favorable sign in disease, although there are cases when the tongue appears normal when the patient is in poor condition.

Saliva

Running of saliva is due to abnormally active glands or denotes a disturbance of the system. It is manifest in many diseases of the throat and chest, especially in those accompanied by nausea and vomiting. Disease of the teeth, foul mouth, ulcerated gums, teeth covered with tartar, indicate errors in feeding, indigestion, and in many cases none too sound a condition.

The Eyes

In both health and disease the eye of the dog is very expressive. In severe attacks of fever which have continued for several days, the eyes will be much inflamed and bloodshot as a result of the excessive amount of blood that has been sent to the head. In jaundice and liver affections the whites of the eyes take on a distinctive yellowish tinge. In cases of brain trouble the eyes are brilliant and glaring and indicate plainly that they cannot bear the light. The pupils are usually enlarged in the early stage of brain trouble, and as the disease progresses they contract. In wasting diseases the eyes sink in their sockets. In poisoning by prussic acid they are found widely dilated, and puppies that are given large doses of Santonine frequently have their vision temporarily affected thereby.

Expression

If the expression of the sick animal differs but slightly from that of health, it may be concluded that the patient's case is not a severe one, or is at least of not long duration. In long-standing disease or in painful affections the expresion will be greatly altered. Victims in an advance stage of debility have a most woe-begone, hideous, dispondent look. In rabies, rage is plainly exhibited, and

when dissolution is near the mouth is drawn at the corners, the cheeks sunken, the lips pale and eyes glassy.

The Pulse

The two great vital processes, the circulation and respriation, are affected in nearly all cases of disease. The pulse is an acute guide to the condition of the heart, and the latter is an organ that responds to every change of the nervous system; therefore, the pulse becomes the most reliable of all sources of information as to the condition of the body. The pulse differs in individuals in health as well as in disease, and something must be known of its individual pecularities to read it correctly. It is important, therefore, to study it in health, so as to promptly detect and interpret its variations in disease. There are several places where the pulse of an animal can be taken. It is most easily felt on the upper part of the femoral artery, just about the middle of the inside of the thigh, near to where it joins the body. It can be taken on the inside of the foreleg, near to the body, or by placing the hand on the chest over the heart. To take the pulse approach the animal as quietly as possible, so as not to excite unduly, and press lightly upon the artery with two or three fingers. If the animal is at all nervous or excited, there will be a temporary increase in the pulse rate, but this will soon subside. The beats should then be counted for a full minute, and repeated at intervals. Care must be exercised while this is being done or there will be a deceptive increase in rapidity. The frequency of the pulse varies with the age of the dog, the size and the breed. In young dogs and in those of the smaller breeds it is much more rapid than in adults and those of larger breeds. At birth the pulse will range from 120 to 150 beats a minute; at six months of age, from 100 to 120; at one year, in dogs of medium size, from 75 to 90 beats. In tiny pets it frequently runs as high as 100 beats, while in old animals the pulse is some-

times as low as 60 beats. During sleep the pulse falls to 50 or 60.

Little is to be learned from the pulse of puppies, toys and dogs unde one year of age, but in large animals the state of the pulse is of material assistance in forming a diagnosis. It requires, however, considerable experience upon the part of the practitioner, as a transient rapidity is often caused simply by excitement, and unless other symptoms are present should not be accepted as an evidence of disease.

The pulse is also subject to variations in character as well as in frequency, and to one who is familiar with the patient and has made a study of the pulse is a valuable indicator. In health the pulse is firm, tense and full of life. By a hard pulse is meant one of considerable force and less than the average volume. A wiry pulse is one of small volume and undiminished force. A soft pulse has plenty of volume and but little force.

A hard pulse is present in most inflammations, but during the first rigor and chill of inflammatory attacks the pulse is usually hard and wiry. A soft pulse indicates general debility and lack of constitutional strength. In most affections of the brain the pulse is full, throbbing and below the normal rate. In cases of nervous excitement it is fast and weak. In exhaustion it is thin and thready, and as death approaches it becomes flickering.

The Temperature

The bodily temperature of the dog is taken by the same thermometer that is used for human beings and in health varies slightly at different parts of the body, being about 101 degree Fahrenheit at the rectum, 100 at the groin and 98½ at the mouth. In puppies the temperature runs a trifle higher, and in dogs in health it sometimes varies one or two degrees between morning and night.

Veterinary surgeons usually take the temperature at

either the mouth or rectum, but the amateur will find it safer to take it at the armpit, the bulb of the thermometer being well covered with the loose skin of the groin and held in that position for fully two minutes before being read. Everyone who keeps dogs should have a thermometer, and it is well to use it in health often enough to determine the normal temperature of the dogs in the kennel, so that all changes can be easily recognized.

In health the temperature in the bowel seldom falls below 100 degrees; a rise to 103 degrees indicates a moderate fever and 105 or 106 degrees a very high fever. If it rises higher, the prospects are unfavorable. A fall to 97 degrees indicates collapse and early dissolution.

A decided elevation of temperature accompanies most disorders of the system and is, in fact, the first symptom of disease, so that if a dog acts suspiciously, shivers, or has a hot, dry nose, the use of the thermometer will indicate accurately the true state of the case.

In pneumonia the rise of temperature is usually rapid and sudden. In distemper, there is at first only a slight elevation, followed by a gradual rise to 105 or 106 degrees, then, if the case is progressing nicely, it may fall to 103 or lower. If the temperature, after remaining around from 102 to 104 degrees, suddenly takes a jump to 106 or higher, it is an evidence of some serious complication, such as inflammation of the brain, bronchitis or pneumonia. Constipation will cause an elevation of temperature of one or two degrees. When pus forms in any considerable quantity there is a sudden elevation, while in common colds there will be registered usually about two degrees, and when it goes higher becomes dangerous.

It is therefore evident that the clinical thermometer is very useful in indicating the condition of the system in all febrile disorders and in uncovering promptly all the changes that take place.

The Respiration

The normal respiratory action of the average dog is

about twenty breaths a minute, varied by age, exertion and excitement. The processes of circulation and respiration are so closely allied that anything that affects the pulse will also affect the breathing.

Panting is usually brought on by overexertion or confinement in a close room after a too hearty meal. It is also present in stages of inflammation of the lungs and other diseases.

Difficulty in breathing is always a dangerous symptom, for life depends upon the blood being properly oxygenated. In pneumonia the air cells block up with exudations from the lungs, and in pleurisy the exudation into the pleural cavity presses upon the lungs and impedes their action.

In simple sleep snoring is of no importance. If, however, the breathing is slow and labored and the patient cannot be aroused, the case is dangerous and indicates a diseased condition of the brain.

In abdominal breathing the ribs are fixed and do not move, the abdominal muscles doing all of the work, and their junction with the ribs is marked by a well-defined line, known as the thoracic line. This indicates that the patient has pleurisy or some painful lesion of the chest, and by keeping the ribs fixed protects the parts as much as possible.

Thoracic breathing is the opposite of abdominal breathing, as now the latter muscles are fixed and the ribs do all the work, which points to trouble in the abdominal regions.

Wheezy breathing is very common and indicates nasal obstruction. In breeds of dogs which have narrow nasal passages, like pugs and bulldogs, it is not an abnormal sign, but in other breeds it is the result, usually, of accumulation of mucus.

In many cases a cough first suggests disease, and it is usually associated with dangerous disorders of the respiratory organs. Accumulations in the air passages

are expelled by coughing, and the cough is either dry or moist, which indicates the condition of the passages. In the first stages of bronchitis or any catarrhal condition of the throat and chest the cough is dry, for the membranes are simply roughened. Later the mucous membranes discharge and as this accumulates the cough becomes moist. In pleurisy, not complicated with bronchitis or pneumonia, it remains dry. In chronic laryngitis it is harsh and husky. There are other coughs due to reflex action, such as teething, worms and indigestion. These are always dry.

SYMPTOMS AND DIAGNOSIS

The Appetite

When a dog refuses to eat, it is simply an evidence that the system is not in condition to receive food, and that Nature, the most reliable of healers, has decreed a fast. This may be due to numerous causes which must be sought out and properly treated. It is well to remember that many diseases are due to an acidosis and the development of a dangerous intestinal poison known as histimine, and it is a mistake to force food upon a stomach that has no desire for it and surely retards return to health.

Vomiting

The dog has remarkable control over the muscles of the stomach. It can vomit at will or by eating a little grass. Emptying the stomach relieves the system of that which is inimical to it, preventing many attacks of sickness and greatly protecting the digestive organs. Vomiting with the dog, therefore, means but little, and is not a symptom of any particular disease, unless repeated violently at short intervals, when poisoning is suggested. It is always well, however, to examine the character of the vomit. If mixed with blood or yellowish slime, gastritis or inflammation of the stomach is indicated. If mixed

with bilious, yellowish matter, it is probable that the liver is out of order.

Thirst

Drinking large quantities of water is not so much an indication of fever as it is of diabetes or some disorder of the kidneys and bowels. In diarrhoea there is a large amount of water which must be drained from the system. in arsenical poisoning large quantities of water are taken to relieve the intense irritation and burning set up in the stomach and intestines by the presence of that dangerous agent.

Loss of Flesh

The fact that a patient is running down in flesh indicates a derangement of the nutritive processes, either in digestion or the assimilation of food, or an abnormal drain through diseased organs. It is a bad sign, if steady and long continued, but it is not diagnostic of any particular disease. In distemper and severe febrile disorders it is rapid and to be expected, but the system usually picks up quickly directly the fever is broken and the disease runs its course.

Fatness

An excessive amount of fat is as much a disease as emaciation. It involves the heart and lungs, which are weakened. The liver and kidneys and the stomach all share in the decline, and the reproductive functions decline. This condition, however, should not be confounded with dropsy or ascites, and the latter can be differentiated by the fact that in dropsical disorders the flesh gives way under the fingers, while the flesh of a fat dog is comparatively firm.

The Urine

The appearance of the urine may change greatly with-

out the subject's health being in any way affected. An excessive amount of urine indicates diabetes. Dark-colored urin, during acute attacks of disease, simply means that the water which is ordinarily passed has been disposed of by the body in some other way and the excretion is condensed. Straining indicates prostatic trouble, inflammation or a partial paralysis of the parts. Blood in the urine indicates an injury and is usually alarming.

The Passages

The appearance of the passages in either diarrhoea or constipation always gives some idea as to what is going on within the system. If the passages are clay colored, the secretion of the bile is defective, or the bile passages are clogged. In any event, the liver is involved. If the passages are dark colored and of a greenish tinge, the liver is too active and too much bile is being poured into the bowels. Offensive smelling passages indicate liver trouble, intestinal irritation or digestive disorders. The presence of dark blood indicates irritation of the bowels. If the blood is bright red and there is much straining, a sharp bone is probably being passed. The constipation that usually accompanies fever is the result of a drying up of watery matter, which leaves the passage hard and chalky.

The Whine

The whine or cry that dogs may utter will indicate to those who are familiar with them something of their condition, for, as a rule, while dogs bark upon the slightest provocation, they do not cry except when in serious trouble. A sharp cry will, of course, always suggest injury. In cases of diseases of the head, when dogs feel that a convulsion is coming on, they often utter a short, high-pitched cry that has a crazy sound. In rabies, one of the most characteristic symptoms is a peculiar wail,

a coarse blended howl, that once heard will never be forgotten.

Pawing at the side of the head suggests ear troubles. Hearing, early in cases of brain trouble, is acute; later, after congestion becomes pronounced, it is defective. Lying on the belly, especially on a strip of cold concrete or wherever it is coolest, indicates a disordered liver. Standing with the legs braced or sitting up with the legs apart, so as the expand the chest, indicates pneumonia. The arched back indicates inflammation of the abdominal regions. The sore, painful gait, general soreness and pained expression indicate rheumatism, while a slow gait indicates debility or old age.

FORMING A DIAGNOSIS

When called upon to treat a sick dog, first of all get a complete history of the case. Then consider this history in connection with the dog's age, associations and surroundings. The greatest mortality among dogs occurs during puppyhood or early youth. Worms and distemper are accountable for more deaths than all other diseases combined. Therefore, if the patient is a puppy or young dog, which has never been treated for worms, it is most natural to presume that the patient has worms, as practically all dogs have. The symptoms of worms should be carefully studied, and if the patient present these symptoms, it should be treated accordingly. If, on the contrary, the dog has none of the symptoms of worms or has been treated for them, some other disease must be looked for.

If the dog is at the distemper age, that is, from four months to a year old, or at about the time it is cutting its teeth, and has never had this disease; if it has been at a dog show or associating with dogs which have recently attended, and a few days later acts listless and out of sorts, distemper can be suspected. The history and

symptoms of distemper should then be carefully studied and compared with the symptoms of the patient, so as to determine whether or not they are alike.

Indigestion, due to many causes, can always be suspected in aged dogs that go off in flesh and refuse to fatten, no matter how much they may eat. It is also to be suspected where the breath is foul and bowels irregular.

Tapeworm is a frequent cause of many obstinate forms of skin diseases that are recurrent and will not yield permanently to external treatment.

Rheumatism is a common ailment of sporting dogs. If the patient is stiff and sore all over, stands humped up and moves stiltedly and cautiously, the cause may be assigned to rheumatism. In the history of most of these cases, the patient has been given a hard run, and while overheated has jumped into a pool or become chilled in a cold rain. If an examination of his sleeping quarters shows that he has slept in a draft or a bed of wet straw, rheumatism would be the logical diagnosis. If the history of the case corresponds with the above, but, instead of being stiff and sore, the animal is found sitting on his haunches, his forelegs braced apart so as to expand the chest, breathing accelerated, membrances of the eye dark and congested, pneumonia is to be suspected. If pressure upon the walls between the ribs causes him to flinch and groan, the pleura or membrane surrounding the lungs is affected, and we have pleurisy. If the small veins of the eye show a yellowish tinge, it is an indication of a disordered liver and jaundice should be looked up and the condition of the patient's bowels investigated.

If a dog that has been in good health is suddenly taken sick, exhibiting violent symptoms of pain and great distress, with attempts to vomit or a rigidity of the muscles, poison should be suspected, particularly if he had been allowed to run about freely, or other dogs in the neighborhood have been similarly affected.

By pursuing these methods, proceeding from point to point with the greatest care, it is possible for any intelligent observer to accurately diagnose disease in the dog.

MEDICINES AND THEIR ADMINISTRATION

The most successful practitioners of medicine use few and simple remedies. They rely upon good nursing, hygienic surroundings and a carefully chosen dietary to accomplish cures, for the greatest advance made by medicine in recent years is in a more complete understanding of focal infection. It is now known that the deadly histimine poison which presents all the symptoms of distemper, convulsions, running fits, can be eliminated by simple medication and proper feeding. There is a time and a place for drugs and medicine, but blind faith should never be placed in medicine alone to cure disease. No matter how correct the diagnonsis has been or how properly the medicine has been prescribed, it will surely fail to accomplish the results unless it is assisted by good care and nursing. On the other hand, there are many ailments, some quite serious, that a carefully arranged dietary and correct rules of living will cure without a single dose of medicine. It is well to bear this fact always in mind and at the head of curative agencies place first: cleanly surroundings, fresh air, perfect quiet, carefully selected food; and, in cold weather, gentle but never extreme warmth.

In prescribing medicine, never use a strong drug where a weaker one will suffice, and in regulating the dose err on the side of giving too little in place of too much. Remember that very young dogs and very old dogs require very small doses.

Never give up hope of a sick dog; they have most remarkable recuperative powers and will frequently take a right turn when least expected.

If a dog is doing well without medicine, do not force it

on him, and, as a rule, if a dog is resting quietly or sleeping, do not disturb him to give him medicine.

In buying medicine, do not be satisfied with anything but the very best. Beware of cheap castor-oil, adulterated quinine and cod-liver oil, and do not guess at doses, measure them carefully and if the medicine is to be given at night keep the dog confined until morning.

In giving medicine to a dog, proceed quietly and without fuss or excitement. Dogs are observing and if they see a lot of preparation, and you are not as cool as you should be, they are liable to follow suit, lose their heads also and become obstreperous.

Administering Medicine

Medicines are administered in the form of pills, liquid mixtures, powders and enemas. In giving oils a small dog can be held in the lap of an assistant. Large dogs, difficult to handle, should be backed into a corner, where they can be controlled. With the left hand grasp the muzzle firmly, and, with the thumb on one side and the fingers on the other, press in the upper lip, covering the teeth, so that if he comes down too hard, he will bite his own lips. His mouth now being opened, and head raised to an angle of about forty-five degrees, place the pill as far back as possible and then shut the jaws. If he does not swallow at once, close his nostrils for a moment, and he will be forced to do so.

In administering liquids, either sit in a chair or have an assistant do so, with the dog between the knees, his back toward the holder. With the left hand take hold of the muzzle, so as to keep the jaws and teeth together. With the right hand take hold of the lower lip and draw it out and up, so as to form a pouch or funnel in which you can pour the medicine a little at a time, and then by keeping the mouth shut the medicine will be swallowed. If the dog hesitates about swallowing, close the nostrils for a minute. This will force him to move his tongue

to get air, and when he does so, the medicine will pass down his throat.

Powders, if tasteless and given in small doses, can be mixed with food. If bitter in taste and not too bulky, they can be inclosed in pieces of beef. When administered this way, it is well to toss the patient two or three pieces that do not contain medicine, so as to disarm his suspicions, before you try him with the piece containing the medicine.

Gelatine capsules are very handy in administering powders. If the dose is bulky it is better to divide it up among several small capsules than it is to try and inclose it in a single large one. Powders are also administered by mixing with butter, syrup or glycerine, and then made into a bolus rolled in tissue paper and placed well back on the tongue.

Enemas

In administering enemas, use a syringe with a hard-rubber nozzle, which should be well greased with vaseline before being used, as well as the parts, and then proceed very gently.

In connection with the administration of medicine, it will be well to remember that all drugs act more powerfully on an empty stomach than when it holds food, either liquid or solid. Therefore, powerful remedies and those which are of irritating character, such as arsenic, iron, nux vomica and cod-liver oil, should be given after feeding, so that they will mingle with the food and be absorbed slowly. Oil can be administered easily if floated on milk. Whisky, alcohol and all fluids of strong taste should be freely diluted with water before administering, at least four parts of water to one of whisky.

Anesthetics

The best way to administer an anesthetic is a matter of considerable importance, for while most dogs bear

pain heroically and submit cheerfully to such minor operations as opening abscesses, docking tails and cutting off dew claws, when dangerous and complicated operations are to be performed, it should be under the influence of an anesthetic, and, as there is always some danger connected with its administration, have it done by someone of experience, if possible.

The best way to administer chloroform is with one of the inhalers that are sold for that purpose. They give it off so slowly as to make it almost impossible to give too much. Be sure to muzzle your dog, otherwise there is danger of his biting. If an inhaler is not available, fold a napkin so as to form a pouch. Commence by giving only small quantities, about twenty drops to half a dram. This should be poured in the pouch formed by the napkin and then placed over the dog's nose. Repeat this every two or three minutes until the dog lies quietly and the eye is insensible to the touch. While under the influence of choloroform watch the breathing carefully, removing the napkin as soon as it becomes slow. If the breathing stops entirely, do not become excited, but remove the muzzle, draw the tongue out as far as possible, hold a piece of cotton or lint to the nose on which is a few drops of strong ammonia and resort to artificial respiration.

Some of the best canine practitioners do not use chloroform for old dogs, but in its place use a mixture of equal parts of chloroform, ether and alcohol. In administering this mixture it is necessary to give it very freely and from a dessert-spoonful to a tablespoonful can be poured on a napkin and held tightly over the dog's nose, and this repeated every few minutes until the dog is insensible.

In the absence of the proper appliances for the administration of chloroform a round tin can of the size that will fit easily over the dog's muzzle can be utilized for the purpose. It should have its sides perforated with holes, so as to allow plenty of air to circulate with the

chloroform. The latter should be placed on a piece of sponge or some cotton in the bottom of the cannister. The can is fastened over the dog's nose by tapes passed behind the ears and tied. When more anesthetic is required it can be injected into the tin through one of the perforations.

It is well to remember that dogs always struggle violently against taking chloroform, therefore be prepared; have one or more assistants to hold the dog and do not neglect to muzzle the patient.

SIMPLE DISEASES

There are a number of common diseases of dogs which will yield to comparatively simple remedies, if taken in time, but if neglected frequently run into very dangerous disorders. The importance, then, of recognizing and treating them promptly is obvious. First among them is ephemeral fever. This is a simple fever, so called because it is supposed to last only one day, whereas it frequently runs for four or five. The first symptom observed will be a loss of appetite; food will be refused or eaten only sparingly, and the general appearance will be dull and out of sorts. The eyes may be clear and the nose cool, but a close observer will notice that the skin under the thighs and on the top of the head is warmer than usual, and if he is familiar with the pulse, he will find it faster than normal and the fever thermometer will reveal two or three degrees of temperature. The treatment in these cases is as follows: Mix an alkaline with the food twice a day to insure alkalization, as most of these cases are due to toxemia.

Imperfect action of the bowels is the cause of much ill health. Regular exercise in connection with a selected diet is the most reliable cure. Whole wheat or graham bread, milk, dogcakes, cooked vegetables, especially onions and greens, are all good. To unload the bowels

there is nothing better than calcined magnesia. The dose is from ten grains to a teaspoonful. In some cases, when the lower bowel is torpid and will not expel its contents, which may be poisoning the system, it is necessary to resort to injections. Soapsuds and water are the established mixture, but a small quantity of glycerine, from a teaspoonful to a tablespoonful, according to the size of the patient, is easier to handle and will answer the purpose better. Sweet-oil also acts well, but has to be used in larger quantities.

Headache is generally overlooked in the treatment of dogs. They suffer with it, however, oftener than is expected. The top of the head is unusually warm; injected eyes, dullness and uneasiness are the common symptoms. The treatment is to bathe the top of the head with cold water for fifteen to twenty minutes. In the morning, before feeding, give a dose of calcined magnesia and follow this with from fifteen grains to a teaspoonful of the Flowers of Sulphur every night for ten days. Reduce the diet and increase the amount of exercise.

Dogs are particularly subject to skin affections, many of them will yield to a lotion composed of paraffin one part, two parts of cottonseed oil and sufficient powdered sulphur to form a cream.

For sprains or bruises there is nothing better than tincture of arnica one-half ounce, alcohol one ounce, in a tumblerful of water; it is very soothing.

For sore eyes very good results follow the use of cold tea infusion, a saturated solution of boracic acid or two grains of powdered alum in one ounce of water.

DISEASES OF MOUTH AND THROAT

Treatment of the Teeth

The mouths of puppies and old dogs should be examined at frequent intervals as they are subject to a variety of troubles which might lead to serious conse-

quences. Puppies sometimes have considerable difficulty in shedding their temporary teeth. When they are loosened it is well to remove them, which can be easily done by pressing on the side of the tooth.

Puppy fits are frequently due to teething and if upon examination of the mouth of a young dog the gums are badly swollen, it is well to lance them. In old dogs if a tooth is decayed and evidently painful, enlist the services of a professional dentist and have the tooth removed.

Tartar collects upon the teeth of some dogs more heavily than upon others. Each case must be studied and treated according to its indications. Good dogcakes and bones tend to clean the teeth. In other cases tartar will have to be removed with appropriate instruments and the veterinary surgeon, as well as the owner, can obtain useful hints by inspecting the tools used by modern dentists.

Tartar is an earthy matter and is deposited on the teeth from saliva. Sometimes it accumulates to an extent that causes inflammation and absorption of the gums and a gradual loosening of the teeth. The importance of watching the teeth carefully is, therefore, apparent. For if the mouth is neglected the gums soften, abscesses form and ulcers appear. It is a very good idea to clean the teeth of house dogs every day with a tooth brush and one of the well-known dentifrices.

Softening of the Gums

This affection is met with more commonly in house pets which have been pampered, over indulged in food and not sufficiently exercised. Such dogs have very little appetite, preferring dainties to wholesome food. An accumulation of tartar or a congested state of the liver and bowels are also common causes.

Symptoms: The breath is usually offensive, disturb-

ances of the digestive organs are apparent and the gums are swollen, spongy, tender and bleed easily.

Treatment: A little common sense in regard to the character and the amount of food will have a good influence on the system in the case of pampered house pets, the denial of food for two or three days, while it may appear cruel, is, as a matter of fact, merciful. A dose of castor oil or syrup of buckthorn or both should be given and only one meal a day be allowed. For two or three days this should be of milk, followed by broths and a little raw meat, dogcakes, etc. The patient should be given exercise, short distances at first and gradually increased as it becomes stronger, the diet becoming more generous as the condition of the patient warrants. The teeth should be carefully looked after, tartar removed and the gums rubbed daily with tincture of myrrh.

Canker of the Mouth

This disease is induced by a decayed tooth or a disease of the jawbone.

Symptoms: A swelling on the jaw over or beneath the diseased part first attracts attention. The parts affected are painful and usually there will be difficulty in makng a thorough examination. Eventually the swelling bursts, discharging matter and blood of a very offensive odor. A fistulous opening remains that will not close permanently until the diseased bone or tooth is removed. The discharge from this fistula has the same offensive character and it ends usually in the formation of a foetid ulcer on the gums and cheeks that bleeds at the slightest touch. The pain and difficulty in eating exhausts the animal, which becomes weakened and emaciated.

Treatment: First remove the causes. If due to a decayed tooth have it extracted and the trouble will probably disappear. If the jawbone is diseased, the patient should be etherized, the gum laid open and the affected

portion removed. Bleeding, growths and ulcerations should be touched with nitrate of silver and later treated with tincture of myrrh. Feed a generous diet of milk, eggs, mutton or beef broth, meat, broken dogcakes, and as the system is usually debilitated, give a course of condition pills.

Salivation

An increased flow of saliva in greater or less degree is a frequent result of disordered digestion, especially of the stomach. The most common cause is the improper use of mercury, either administered internally or used externally too freely. In prescribing mercury to dogs it should be remembered that as in human beings, some animals are more easily affected by its action than others and that susceptibility of salivation and a tendency of certain diseases often go together. Salivation might also arise from decayed teeth, some irritation of the salvary glands, or by a sudden check to the secretions of the skin by cold and damp.

Symptoms: The breath is more or less feeded and the gums and other parts usually suffer. Usually there is inflammation of the tongue and throat with shallow ulcerations on the inner surface of the gums, which are red, swollen and spongy. The inside of the cheeks are also similarly affected. The teeth loosen and are discolored and a collection of lime salts and entangling foreign matter collects on the teeth, corroding them and resulting in ulceration of the gums and as the ulcerated action becomes communicated to the stomach and intestines, there is a loss of appetite and a failure of strength.

Treatment: In cases due to over dosing of mercury, give the iodine of potassium in three grain doses three times daily. Decayed teeth should be extracted and as a local application for the gums and affected membranes use a tincture of myrrh or a saturated solution of chloride of potassium. The bowels should be kept open, the

diet should be generous and if there is much debility, tonics of iron, or cod liver lactate should be administered and calcarated compound mixed with the food.

Inflammation of the Tongue

A great swelling of the tongue, tenderness and difficulty in swallowing characterizes this disease, usually accompanied with severe salivation, but may occur independently in an acute form. In some cases it runs a rapid course without the formation of matter; in other cases abscesses form under the tongue and may threaten suffocation.

Treatment: Aperient medicines should be given promptly and applications of ice or ice water made continually to the tongue for hours until relief is afforded. Chloride of potassium or borax should be added to the water. If suffocation is threatened an incision along the middle of the tongue on the under surface should be made. The services of a surgeon will be necessary to perform this operation. If abscesses form they should be opened by a surgeon as there is always danger of severe hemorrhages. The food should be liquid and concentrated. A cup of milk into which a raw egg has been beaten may be given every three or four hours.

Pharyngitis

The pharynx is located behind the mouth, nose and larynx and is a part of the canal through which the food passes. Inflammation of this organ independent of some other disease is of rare occurrence and it is usually associated with some other disease. When appearing as an individual affection it is the result of the enlargement of some foreign body such as sharp pieces of bone that will produce a sense of choking and fits of coughing more or less severe. Frequent hawking is often the first symptom. Later on the mucous membrane be-

comes swollen, swallowing becomes difficult. In severe cases, but rarely, abscesses form in the back part of the throat and their presence may be suspected if the animal carries his head kept fixed and immovable on his neck.

Treatment: Explore the throat with the finger for foreign bodies, which should be removed. The inflammation of the membranes should be treated the same as recommended in acute laryngitis and if repeated efforts fail to dislodge the substance, ipicac and sulphate of zinc should be given in 15 grain doses to induce vomiting.

Choking

This is of very frequent occurrence with dogs, as they use their mouths much as we do our hands in grasping and conveying various objects. The commonest objects on which dogs choke are bones that they have been feeding upon. If the bone lodges in the back of the throat it may set up such a violent coughing and retching as to asphyxiate the subject. The back of the throat, however, is not the usual lodging place, for as a rule the bone or other object passes that point, where the gullet is comparatively large, and lodges over the heart, where it is smaller. Locating at this point causes the greatest distress. The dog keeps gulping as if trying to swallow, and from time to time is seized with a period of retching. In a day or two the extreme distress passes, and the patient drinks water and milk or other liquids freely and can also swallow raw eggs, but if solid food is taken, directly it reaches the obstruction it lodges. Young dogs and those which are playful sometimes swallow needles and pins. These usually become imbedded in the back of the tongue, and can be removed from that position, but sometimes they reach the gullet and pass through into the tissues, forming an abscess, their usual location being just behind the angle of the jaw. Removing needles and pins from the back of the tongue is done most easily with a pair of forceps, although it sometimes can be done with

the finger. The principal thing is to be careful not to break the object. The symptoms in these cases are usually very severe, so that prompt action is necessary. In those cases where a bone has passed far down the gullet and lodged over the heart it is sometimes sufficient to feed the dog a few pieces of meat, which will force the obstruction on. If this is not successful a probang must be used to force the obstruction down in to the stomach, but this should be attempted only by a skillful veterinarian or a physician, as it may be necessary to use considerable force, and there is danger of rupturing the gullet, which is fatal. If the obstruction cannot be removed by the probang, then the only thing remaining is to feed the patient on liquid food until such time as the sharp points of the bone become dissolved and rounded off, so that it will be easily pushed along by the probang.

Acute Laryngitis

The larynx is located at the upper and fore part of the neck at the base of the tongue. It has a double function, that of the voice and of respiration and is subject to frequent inflammations more or less severe.

The principle causes are extremes in temperature and the result of faulty kennel arrangements, the presence of foreign bodies, the spread of inflammation of adjacent parts as nasal catarrh, prolonged barking or injury to the neck, such as might result from continued tugging at a chain.

Symptoms: The most diagnostic symptom is a hoarse barking cough which is increased by pressure over the wind-pipe. In the early stages the saliva is thick scant and of a mucous character. Later it becomes abundant and more easily expelled. In mild attacks breathing is not accelerated. In severe attacks the breathing is labored and heavy and accompanied with a harsh sound. There is difficulty in swallowing, a slight bubbling discharge from the nose, the eyes are congested and the

countenance of the animal displays the pain it is suffering. In severe cases that are violent spasms and breathing is slower than normal. In mild attacks there is little or no fever. In severe attacks it is more or less intense and the pulse is correspondingly accelerated.

Prognosis: If there is but slight difficulty in breathing, the patient will recover. If there are spasms and great difficulty in breathing, the results are liable to be fatal.

Treatment: The patient should be placed in a room with an even temperature. Hot applications to the neck frequently changed will ease the pain. A dose of castor oil should be given and Dover's powder in five grain doses will promote the comfort of the patient. If the attack is so severe as to threaten suffocation, medicated vapors are desirable. Make a tent by placing a sheet over two chairs. Under this the dog can be placed and steam can be generated by placing a hot iron or stones in a pan of water. Medicate the steam by adding a tablespoonful of the compound tincture of benzoine to each quart of water used. Should the disease become chronic a permanent cure is of rare occurrence. Painting the neck with a tincture of iodine in some cases gives results and in other cases use of the iodide or potash is recommended. Good results from those drugs however, are apparent only after prolonged administration. In all inflammation of mucous membranes the most useful drug is the chloride of potassium; an ounce to a pint of water. The dose for a medium-sized dog being a tablespoonful of the mixture every two hours.

DISEASES OF AIR PASSAGES

Breathing Difficulty

Short-faced dogs, such as pugs, Bostons and bulldogs, frequently have difficulty in breathing, sometimes during a period of excitement it is so labored that the dog will all but suffocate or fall over on its side as if on the verge of asphyxiation, and under ordinary conditions the

sides heave heavily and quantities of white, frothy mucus are brought up, especially when first turned out in the morning. Usually in these cases the condition is more or less complicated by a weak heart. Although operations are sometimes performed in these cases and the false palate removed, they are seldom successful. The most that can be done is to carefully select the diet, so as to obviate danger of aggravating the condition by a disturbance of the stomach. Feed three times a day on raw meat cut into small pieces; do not overload the stomach at any time and mix a teaspoonful of calcarated compound with the food three times a day.

Catarrh

This disease in its early stages is nothing more than a common cold, with a thin mucous discharge, which eventually thickens, becomes chronic and is then referred to as catarrh. In its early stages it speedily yields to treatment, but if neglected it becomes dangerous, and no one knows where it will end. Puppies are more prone to colds than grown dogs, and the strong, rugged breeds that spend most of their lives out of doors are not nearly so likely to be affected as those kept as house pets in heated rooms and taken out from time to time for exercise under varying conditions of temperature.

Causes: Colds and catarrh may be the result of neglect in any form, such as leaky kennels, allowing a sporting dog to stand around in the rain or after a hard day's work to sleep at night on damp bedding. Exposure of any kind when tired or exhausted and the vitality is low is also apt to be followed by a cold.

Symptoms: In severe cases the patient is dull, lifeless and a picture of lassitude, inclined to curl up and sleep any place and dispirited when disturbed. The appetite is lost or capricious; this is followed by running at the nose and a slight discharge from the eyes; the membranes of the eye are inflamed and darker than

usual. Sneezing is frequent, and the discharge from the nostrils indicates the extent of the disorder; it is a thin mucus, and not sticky, as in distemper. The dryness of the nose and the heat of the mouth denote the amount of fever, but as a rule there is no rise of temperature, as in distemper, nor do the teeth become discolored, as in the latter disease. If the inflammation and catarrhal condition extends to the membranes of the throat there will be a cough; if it is confined to the nostrils alone there is simply a discharge.

Treatment: This is simple and the condition easily cleared up if taken in time. Give the patient a dose of castor oil as soon as it is observed to be "off its feed" and ailing; keep in dry, comfortable quarters; give plenty of water to drink, in which you may dissolve a teaspoonful of the chlorate of potash, and mix powdered sulphur with the food three times a day. Treat for worms; feed dog cakes, meat and vegetables.

Asthma

This disease is most common in old dogs and those which have led sedentary lives and accumulated an excess of fat. The symptoms are much the same as in people —heavy breathing, troublesome cough, and if the ear is applied to the chest a cracking noise is heard with each inspiration. The heart is usually weak and the pulse irregular.

Treatment: Open the bowels with aperient medicine, which should be repeated as often as may be necessary to keep them open. Do not overexercise, as the heart and lungs usually are not strong enough to stand the strain. Be very careful about the diet, avoiding all starchy food, sweets and pastry, and, in the way of medicinal treatment give condition pills. The best food is raw or cooked meats and dog cakes.

Chronic Catarrh Ozaena

This disease is really an advanced or chronic form of catarrh in which the membranes are so badly affected that the discharge is purulent and more or less bloody. It has a tendency to form crusts deep within the nose and the outer openings will be coated. The breathing through the nose is obstructed and there is more or less contant sneezing.

Treatment: Cases of recent origin can be cured provided the general state of the system is not too badly run down and the treatment is persisted in patiently. Internally give tonics of quinine, iron, cod liver lactate, feed a generous diet and treat the mucous membranes of the nose with a 10% solution of Argyrol five drops in each nostril. This treatment is not to be repeated in less than 4 days.

Bronchitis

This trouble is of frequent occurrence and is due to an inflammation of the lining of the air passage leading down into the body of the lung, it may be the result of a cold or chill or the breathing of smoke or noxious vapors.

Symptoms: There is more or less difficulty in breathing, severe and constant coughing and the accumulation of phlegm in the windpipe. In bad cases the patient will not lie down, but sits with the forelegs braced and the chest expanded.

Treatment: Place the patient in a room comfortably warm without being overheated, and moisten the air by keeping a bronchial kettle going. If the throat is so full of phlegm that breathing is difficult give an emetic of the wine of ipecac in doses of a half to two teaspoonfuls, repeated in one hour, if necessary. After the stomach is erupted and the patient has quited, use the the following mixture: Paregoric six drams, Hoffman's spirits two drams, ipecacuana wine

one dram, syrup of squills one ounce, water to make three ounces. The dose is a teaspoonful to tablespoonful every four or six hours. Keep the bowls open by occasional doses of aperient medicine and repeat the emetic if the breathing has not improved in forty-eight hours, after the acute stage of the disease has passed and the cough is better give cod liver lactate. Feed on milk, meat broths and soup during the early stages of the disease, and as the severe symptoms abate meat may be given.

Bronchitis (Chronic Husk)

This condition is the result of a more or less chronic thickening of the membranes lining the air passages, so that the dog is in apparent good health with the exception of a hard, dry, husky cough that is brought on by any excitement or exertion, and is usually worse in the morning and at nights. These attacks of coughing end usually in a retching and gagging, as if vomiting or expelling a piece of phlegm from the throat.

Treatment: Give aperient medicine so as to keep the bowels open and use the following mixture: Tincture of nux vomica thirty drops, syrup of squills once ounce, water to make three ounces; dose from half a teaspoonful to a tablespoonful three times a day after feeding, the first for a toy, the second for a St. Bernard or one of the large breeds. If the cough is very severe give from fifteen drops to a teaspoonful of glyco-heroin in water. Feed underdone meat, raw eggs, gelatine or whole dog cakes that will not distend the stomach unduly, as a distension of the stomach brings pressure on the chest and aggravates the condition. Give condition pills.

Pneumonia

This disease is an inflammation of the body of the lungs as distinguished from pleurisy, which is an inflammation of the membrane covering the lungs. It is a very serious

disease and frequently fatal. The severity of the disease is measured largely by the amount of lung affected. In some cases only a small portion is involved and in other cases it is general.

Causes: In many instances this disease develops without any apparent reason but usually it follows exposure to cold and is also a common complication of distemper, a specific germ is recognized in connection with the disease therefore it is well to regard all cases as infective.

Symptoms: In most cases the disease is ushered in with a chill and shivering. In some cases there is pain and in other cases there is not. There usually is a cough and the matter raised is at first scanty then thick and white and later grayish in color. In other cases it is of a reddish tint like iron-rust. There is more or less complete loss of appetite, the nose is hot and dry, breathing accelerated, pulse is rapid and other symptoms of high fever. To expand the chest the patient assumes a sitting position with extended head, open mouth and protruding tongue. The temperature may go to 104 or higher. The membranes of the eye are highly congested and as the disease progresses turn darker and darker. The distress becomes more apparent, the nostrils dilated, the general expression piteous and haggard, eyes are sunken, the mouth and lips covered with slime, the breath has a sickish odor, the skin cold and clammy and death intervenes.

Diagnosis: In this disease the chest sounds are highly significant and can be recognized by applying the ear to the side of the chest or better still by the use of a stethoscope. In most cases in the early stages crepitation can be heard. This is a dry, crackling sound heard only on inspiration and is much the same as that made by walking on crusted snow. In the second stage, if the lung has become solidified, the sound of the air in the bronchial tubes can be distinctly heard with or without crepitation. Percussion (that is tapping on the side of the chest) gives forth a dull, flat sound quite unlike the resonant sound

that is given forth in tapping the side of a healthy animal. The help of instruments is unnecessary in percussion; simply place two or three fingers of one hand flat on the side of the chest and strike them a short quick light blow with two or three fingers of the other hand. The blows should be light, even, and but once on a spot, the hand on the chest being moved rapidly from one place to another so that a comparison can be made and all differences noted. In listening to the respiratory sounds of the chest a thin piece of cloth, such a handkerchief, can be interposed, but it is better to use a stethescope, as by its aid the sounds can be distinguished more clearly.

In cases of recovery as the solidified air cells begin to clear up the respiratory action becomes more natural, crepitation usually returns and frequently a sub-crepitation sound is heard either on inspiration or expiration. This sound is fine, moist and bubbling like the breaking of small bubbles. The flat, dull sound of percussion becomes clearer and the stethoscope will reveal the removal of the exudation.

Treatment: Pneumonia if uncomplicated usually runs a definite course and if the animal's strength is maintained a recovery is made. Therefore, the object of all treatment is to avoid anything that would depress the system and use every means to support and sustain the patient. A room of even temperature should be chosen and good ventilation maintained. A jacket for the chest should be improvised out of warm soft woolen blanket or several thicknesses of cotton-batten quilted on to cloth, roughly shaped to envelope the chest from well up on the neck to the loins, the holes being cut for the fore-legs and fastened over the back with strings of tape. This is the best protection that can be afforded an animal and it will prevent changes of temperature on the surface of the skin over the affected parts. Although some authorities recommend blistering, we do not consider it advisable in any case as

the nervous system of the dog is too responsive to justify it.

The food at first must be light and of a fluid nature. If there is evidence of pain and the cough is troublesome, a little paragoric or a Dover's powder may be given. In the first attack of the disease whiskey or brandy in small doses mixed with water, fluid beef or egg-nog, will sometimes have a very happy result. The chief reliance however, in treating this disease is nursing, light stimulants, and as the patient passes the crisis tonics, such as the tincture of iron.

Acute Pleurisy

The inner side of the chest cavity is lined and the outside of the lung covered by an exceedingly delicate membrane, the pleura. The surface of this membrane is smooth, polished, glistening and moistened by a fluid that lubricates the surfaces. In pleurisy this membrane becomes inflamed, the secretion dries and the two opposed surfaces rub together, which causes great pain and in most cases, upon application of the ear to the chest, a grating or crackling sound can be heard. Usually this dry period lasts about twenty-four hours after which there is an effusion of water into the affected side which in some cases partially fills the cavity and in bad cases so completely, as to compress the lung into a small solid mass. Pleurisy may affect one or both lungs.

Causes: This disease may appear from unknown internal causes or it may follow some bruise or contusion of the chest, especially if accompanied with fractured ribs. It is a frequent complication of other diseases of the lungs, of disorders of the blood, and diseases of the kidneys.

Symptoms: In some cases the disease is ushered in with a chill and shivering. In other cases there will be pain or soreness for two or three days, but usually the attack is sudden and is accompanied by intense pain. It increases during inspiration so that the breathing is short-

ened and arrested before completed. This is due to the pain caused by the rubbing together of the inflamed sides of the pleura as the lungs expand. There is a cough which the patient attempts to suppress and accompanying this are all the indications of fever, such as great thirst, nose hot and dry, tongue slightly coated, watery eyes, restlessness, a pleading anxious look, the whites of the eyes reddened and the lining of the lids deep in color. These are the symptoms early in the attack. After the effusion takes place the pain is lessened but the breathing continues hurried. If a large amount of liquid is effused the patient suffers for want of breath and may be obliged to maintain a sitting posture with the fore-legs spread widely apart. With a smaller quantity of effusion the animal lies down on the affected side, as in that position it is able to expand the opposite or well lung more fully. If there is a large quantity of fluid present breathing becomes more difficult and labored, and there is a heaving action of the muscles of the flank, the limbs become swollen and death may result from suffocation.

Diagnosis: The principle thing is to distinguish between pleurisy and pneumonia. The pained anxious expression, tenderness of percussion and the friction sound with the shallow, quick, catchy breathing is characteristic of pleurisy. The temperature is not as high as in pneumonia.

good hygenic surroundings. The extreme pain can be relieved with a dose of Dover's powder from five to twenty grains. The chest jacket is very useful and should be applied at once. A mild aperient should be given.

If within a reasonable period the fluid does not disappear from the chest, it will be necessary to draw it off by tapping with a small trocar and canula or better still with an aspirating needle. The puncture should be made low and far back. As soon as the animal starts convalescing it should be fed the best of food and given tonic remedies such as iron, quinine and gentian.

Chronic Pleurisy

Sometimes follows the acute form of the disease, most cases develop through imperceptible symptoms and there is a slow effusion of water into the pleural cavity. In the cases that recover this is absorbed. In other cases adhesions are formed which unite the inner surface of the chest walls to the pleura covering the lungs. As a result the chest walls become contracted and breathing is more or less interfered with.

Causes: It may be induced by bruises or injuries and is sometimes due to exposure, but more often is the result of internal causes which are not well understood, usually affections of the blood and kidneys.

Symptoms: In this chronic form of pleurisy the cough pain and tenderness are frequently wanting and the only marked symptom is the increased frequency of respiration. This is not so evident at rest, but is very apparent on exercise. The embarrassment in breathing, as in the acute form, depends upon the amount of effusion. The appetite is impaired, in some cases there is emaciation. The pulse is small, compressable and runs above normal.

Prognosis: Chronic pleurisy in its simple form occuring in an animal previously healthy and free from any other serious disease will usually recover, but in some forms of the disease there is a breaking down of the lungs similar to consumption. These cases terminate fataly.

Treatment: The object of treatment is to sustain the general strength and remove the liquid that has accumulated in the chest cavity. Mild laxatives should be used. Regular exercise, nutritious diet and hygenic surroundings are all very essential. Tonic remedies are also indicated such as: the tincture of iron, beef, quinine and wine.

Influenza

This disease is very well known among men, and is common among horses, and may occur among dogs unin-

fluenced either by the age of the animal or the season of the year. It is epidemic in nature and characterized by a catarrhal condition of the respiratory membranes.

Symptoms: The common location of the disease is upon the mucous membranes of the nose and throat and in rarer cases it affects the stomach and intestines. In old animals and those that are debilitated, it may extend to the lungs. The disease usually comes on suddenly as with a chill, shivering and lassitude. The breathing is altered, there is frequent sneezing, the eyes become affected and there is a watery secretion from the nose and eyes. the nasal membranes are red and swollen, the pulse is variable in character, usually full and very irregular. Sometimes in the very beginning a cough sets in that is dry and disturbing ending sometimes with paroxysms that induce vomiting. Later the prostration is very marked. the patient is dull and sleepy and in walking about is sometimes stiff and lame to the point of painfulness. The eyes have an anxious look, there is a tendency to dropsy of the limbs and sometimes an effusion into the chest.

Diagnosis: The great prostration from the first, the intermittent fever, the absences of complications of the lungs, the peculiar cough and the fact that the disease exists as an epidemic affecting other dogs at the same time renders it easy to distinguish this disease from others of like character.

Prognosis: In old dogs and young puppies the disease often runs a severe course and terminates unfavorably, but in uncomplicated cases where the animal has been in fair health recovery may be expected if the patient is kept quiet and properly treated.

Treatment: Place the animal in a well ventilated room of an even temperature, that is, free from drafts. Give a gentle laxative such as olive oil. If the throat is severely inflamed hot applications should be applied to the neck or a liniment used and the neck afterwards bandaged in cotton or flannel. If the breathing is difficult, a resort

may be made to the steam inhalation medicated with the tincture of Benzoin mentioned in connection with acute laryngitis. The diet should be of milk, meat broths, eggs and cooked cabbage, carrots and onions with dog cakes.

If the fever is very high quinine in two grain doses should be given every hour; after the temperature becomes normal the quinine can be continued in one grain doses. In the beginning of the disease the bromide of potassium can be given after the patient is on the road to recovery, nux vomica can be administered in connection with iron and beef and wine, the latter being a food as well as a tonic. In all of these cases it is advisable to exercise great care with their food to produce alkalization and overcome the acidosis that produces the deadly histimine.

DISEASES OF LIVER, SPLEEN AND KIDNEYS

The Liver

The liver is the most important of all the solid abdominal organs. It is subject to inflammation, termed hepatitis, and this may be either acute or chronic. Acute hepatitis is rare among dogs in colder climates, but not infrequent in the tropics. Where it occurs in cold climates it is probably due to kicks and blows, but might be the result of the excessive use of purgatives, emetics and exposure to cold and wet. It has been known to follow severe cases of dysentery or gastric inflammation and may be associated with such diseases as pneumonia, pleurisy and distemper.

Symptoms: These at times are vague and the diagnosis is not always easy. More or less pain, tenderness over the liver on pressure, disturbed digestion, foul breath, altered respiration, lying on the chest and belly, jaundice with chronic and febrile symptoms. If a physical examination discloses an enlargement of the liver in connection

with the train of symptoms mentioned, the diagnosis between this disease, gastritis or enteritis is clear. An attack of the disease is often ushered in by a chill as shown by shivering, but this symptom would probably be overlooked. Soon after the invasion of the disease however, the manner of the dog changes, becoming dull and listless. There is a loss of appetite, an appearance of discomfort, a disinclination to exertion, stiff, painful movements, excessive thirst, vomiting in some cases and offensive breath, disturbed bowels, a rise in temperature and a full, rapid pulse. Jaundice usually appears four or five days after the first symptom. The skin and whites of the eyes become yellow, the mucous membrane of the mouth paler and the pulse, which has been rapid, falls below normal. The disease proceeds rapidly. Some cases terminate in abscesses and some resolve into a chronic form. In cases of abscesses, a swelling over the region of the liver can usually be determined. Emaciation is rapid and there are all the signs of exhaustion.

Prognosis: This is a dangerous disease, particularly when associated with other diseases. Nearly all cases in which abscesses form are fatal and even if recovery takes place convalescence is slow.

Treatment: To arrest inflammation and prevent the formation of abscesses is the first purpose of all treatment. The pain and general disturbance of the system indicate the use of Dover's powders in five grain doses every six or eight hours. In most forms of liver disease mercury is indicative and a pill that can be used for this purpose is prepared as follows: Hydrag. five grains, Pulv. Ipecac, two grains to be divided into twelve pills and one given three times a day.

Chronic Hepititis

This disease may be a sequel to acute inflammation of the liver, but it is difficult to trace the morbid changes

with accuracy, for as a rule the disease present few or no symptoms which point directly to the liver.

Symptoms: The manner of the animal usually changes and it becomes dull and heavy. There is a loss of appetite, progressive emaciation and the abdomen becomes distended, the tongue becomes white, the membranes of the mouth and lips lose their pinkish color and become pale and yellowish and there is a more or less jaundice condition. The skin thickens and becomes rough and scaly, the hair becomes dry and coarse, the breath is offensive, eyes are dull and heavy; vomiting is frequent and in some cases the abdominal distension progresses to a degree that interferes with breathing. In other cases there is a contraction of the liver, in these cases the distension of the abdomen is due to ascitis.

Diagnosis: If the liver is enlarged its outline may be traced with the hand, when the animal is standing. An enlarged liver is carried higher, and there is not the drooping appearance that is characteristic of dropsy. If the liver is affected, the shape of the abdomen is not retained when the animal lies down, but in cases of dropsy it remains much the same.

Prognosis: This disease is usually incurable and about all that can be done is to arrest its progress.

Treatment: There is no specific treatment. Tonics and nutritious foods are indicated, and prominent or aggrevated symptoms demand individual treatment. When constipation exists laxative rather than cathartic treatment should be given.

Occasionally minute doses of calomel, 1/30 of a grain, or the iodide of potassium, two grains, may be tried given two or three times daily. In using the latter drug it should be understood that it is necessary that treatment be persisted in for several weeks and should be followed by a cathartic.

Degeneration of the Liver

This disease is commonly found among old animals that have been over-fed without sufficient exercise. It is practically impossible to cure the disease, but it is sometimes possible to mitigate the symptoms by careful attention both to the quantity and quality of food and by increasing the exercise. No fatty or starchy foods should be given for a time, and then as little as possible, and feed the patient exclusively on sweet milk and butter milk with a very limited quantity of meat.

Jaundice

This disease is never an individual affection, it being a symptom and incidental to some other disorder. It is characterized by the presence in the blood of sufficient biliary matter to give a yellow color to the skin. This failure upon the part of the liver to do its work might arise from organic diseases or be merely the result of some functional disturbance or obstruction to the outflow of the bile.

Causes: It often appears without any clearly determined cause, but in the majority of cases it is due to an obstruction of the passage of the bile to the intestine, and it accumulates in the blood. The more common causes are bad management, injudicious feeding, exhaustion from violent exercise, especially among sporting dogs if left without grooming, the poison of certain diseases and intestinal toxemias.

Symptoms: In the earlier stages these are vague and confusing, for the reabsorbed bile exerts a narcotic influence upon the nervous system and the animal becomes dull, languid and sleepy, averse to exercise, the coat becomes dry and staring, the mouth and breath are hot and dry, the abdomen hard and the back arched. In some cases there is pain and tenderness.

Treatment: The patient should be made as comfortable as possible, protected from drafts and given gentle but

regular exercise. The diet should be carefully watched and only food of a bland character such at toasted bread and milk, broken dog cakes, in small quantities, should be given. Fatty food is to be avoided. Butter milk will be found useful. Give calomel in small doses, half a grain three times a day is also indicated and the following prescription is recommended:

Tincture of rhei	1½ oz.
Bicarbonate of soda	1 oz.
Tincture of Gentian Compound	1½ oz.
Syrup of aurantii	2 oz.

Water sufficient to make 8 oz.

Dose: A dessert spoonful fifteen minutes before feeding, three times a day.

Torpor of the Liver

The character of the food, irregularities in feeding and lack of exercise all tend to promote disorders of this important organ and a deficient secretion of the bile is referred to as torpor of the liver.

Symptoms: In mild attacks there are no very marked symptoms, although it is evident that the animal is not in the best of health as the coat loses its characteristic gloss and becomes rough and harsh and dry and the skin is inclined to eruptions and eczema. As the disease progresses there is more or less dullness of manner, a capricious appetite, whitened tongue, offensive breath and hot nose. The patient's manner may change under excitement, but it soon becomes dull and listless.

Treatment: The first indication is a careful dieting. Food should be allowed but once a day and that of simple character and limited quantity, such as milk, stale bread and broken dog cakes. Exercise should be encouraged. If there is an inclination to constipation give a half teaspoonful of calcined magnesia and repeat as often as may be necessary to keep the bowels open.

Affection of the Spleen

The special function of the spleen is not fully understood. It is an organ that can be removed from the dog without any permanent injury and where this experiment has been performed the only changes that have been noted are an increase of appetite and a more savage disposition. Acute inflammation of this organ is a very rare affection and rarely diagnosed during life.

Symptoms: Those which have been observed in connection with this disease are tenderness over the organ, loss of appetite, restlessness, vomiting, extreme thirst, protuberant eyes, shivering, the ears cold and the nostrils dilated, mucous membranes pale, vomiting of a frothy mucous, agitated flanks and accelerated breathing. In certain diseases of the general system the spleen becomes enlarged for a time and then returns to its normal size.

Treatment: Inasmuch as it is impossible to diagnose the disease during life the only thing that can be done is to treat the general symptoms, which are very much the same as those in chronic hepititis.

Diseases of the Pancreas

Of all similar organs the pancreas is the least liable to inflammation. It may however, be affected the same as the liver, kidneys or any of the other glandular organs and would doubtless take on the same degenerated changes if involved by the extension of the disease in adjacent parts. The most diagnostic system of disease of the pancreas is the discharges of fat from the bowels.

Sugar in the Liver

The presence of sugar in the liver is common to all species of animals and the average percentage is about the same in the dog as it is in man. It has been maintained that starchy and saccarine matters are unfit for food to the canine race simply because the liver has this sugar-secreting function. In feeding dogs it is well understood

that starchy matters are not digested in the stomach but pass into the smaller intestines unchanged where the intestinal fluids transform them into sugar promptly and they are then quite as rapidly absorbed. If a dog is fed on boiled starch and meat, the starch is at once passed into the intestines where it is converted into sugar and absorbed. The whole of the starch may even disappear within the course of an hour, whereas the meat will remain in the stomach for from eight to twelve hours. Therefore, while the dog is recognized as a carniverous animal, it is also capable of absorbing starchy matters in small quantities.

DISEASES OF THE SKIN

Mange

This is the commonest and most loathsome of the various skin diseases affecting dogs and is the cause of much trouble and suffering; true mange is local in character and if treated promptly can be easily cured. If it is neglected, it soon spreads all over the body and has a very debilitating effect on the system, as the patient looses both sleep and rest in constant efforts to relieve the intolerable itching. A simple case of mange if not properly treated will also soon be complicated with eczema induced by the scratching as well as by the exudates from the affected surface, poisoning the skin and adjacent tissues.

Causes: This disease is similar to itch in man and is due to the presence of a small insect, the sarcoptes scabiei, invisible to the naked eye. The male mange mite is smaller than the female and lives in short burrows; the female tunnels the skin in long canals laying one egg after the other until it dies usually in about four months —meanwhile she has laid about fifty eggs. The eggs hatch out in about two weeks and the young mites come to the surface, seek a furrow in the skin, attach themselves and like their parents begin burrowing down to

the softer layer of the skin—the membrane malphigie which contains a great deal of fluid upon which they live. Although mange is most commonly met with among dogs in dirty kennels, dirt itself is never the cause of the disease, it simply encourages the spread of the pests by leaving them to conduct their burrowing and blood-sucking habits undisturbed.

Symptoms: The parasite has a preference for certain parts of the body, the head, neck, abdomen, chest, roots of the tail and paws, and in the early stages is easily recognized.

At first the entrance to the canals will be marked by specks which soon become small moist nodules; these nodules stand alone and not grouped together as in eczema. In appearance they are pointed and not flat as in the latter disease. They eventually dry up leaving a small scar. The itching caused by the burrowing as well as by the mites creeping over the surface incites scratching which opens up the canals and releases more insects; the small pimples and nodules are broken down, bloody matter exudes which hardens into thick dry crusts. The multiplication of the mange mites is so rapid that if left unchecked it soon spreads all over the body and the patient from want of rest sinks into a helpless condition, the crusts and scabs mat the hair together in patches which fall off or is rubbed off by the patient against any convenient object. In neglected cases a healthy good-looking dog soon becomes the most loathsome of objects.

There is a dry scurfy form of mange which does not destroy the hair so rapidly. It is confined principally to the flaps of the ears; the face about the eyes; and the joints of the legs. It causes the dog great uneasiness and an affected animal soon looses its glossy coat and well kept appearance.

Treatment: Although dirt does not cause mange, it is the first thing to be considered when treatment is undertaken. The affected animal should be thoroughly

washed in luke warm water and well scrubbed with dog soap and dried with soft cloths that are afterwards promptly boiled; care must be exercised to see that whatever medication is used is thoroughly applied so that it reaches the skin where the mites live and does not stop with simply covering the hair. After a dog has been treated, it must be placed in fresh, clean quarters for if returned to its old kennel, will soon be reinfected. The old bedding should be burned, the walls of the kennel sleeping boxes and yards thoroughly disinfected with germicide and boiling water and then whitewashed. The kennel yards dug up and soil mixed with lime, ashes and rock salt. The sovereign remedy for mange and all skin diseases due to animal parasites is sulphur, preferable in the form of a lotion, if sulphur lotion is used, it should be diluted one-half with water and then sopped on the skin without rubbing, a general application is advisable, even in those cases where the signs of the disease are restricted to only one part of the body; among the other parasitic agents are carbolic acid, coal tar, epicarin formaline salycilic acid and peruvian balsam.

Ashmonts prescription for mange is potase carbonatis one oz; sulphur flor. three oz; glycerine six oz. It should be used to cover freely both the affected and unaffected parts, allowed to remain on for 48 hours and then washed off. This treatment should be repeated in a week.

The balsam of Peru is a very useful agent in treating skin diseases. It also works well in eczema. It can be combined with sulphur in the following ointment: Sulphur Flor. and Balsam Peru of each one oz. Lanolin and Vaselin of each two oz. Applied twice a week for a week and then washed off with luke warm water and soap suds.

Inasmuch as no agent that can be applied to the skin safely will kill the unhatched eggs in the canals it is important that treatment be repeated two or three times at

intervals of a week so as to kill the young mites as they hatch out until all are destroyed.

Eczema

This is the most frequent of the cutaneous skin diseases of the dog, being especially observed to start at the base of the tail, on the back or neck, and from these points may spread in all directions. For simplicity and shortness sake we will not mention varieties or kinds of eczema, but simply speak of eczema, as an acute or chronic inflammation of the skin, manifesting itself either in reddened or scaly patches, papules, vesicles, pustules or fissures, characterized in many cases by the exudation of a colorless or yellowish fluid, which dries into amber-colored or brownish crusts and is generally accompanied with itching.

Causes: Eczema is not a distinct pathological entity; it is rather a group of symptoms which characterize the effect of some irritant on the skin. In other words, it is a dermatitis due to some external or internal influence and does not describe any specific disease. It is a handy name to give most any skin disease, when no definite cause or reason can be found for the trouble. When the cause of a hitherto undiagnosed form of dermatitis, that has been numbered in the group of eruptions that we now call eczema, is settled permanently, it is generally taken out of the group and given an independent place in the scientific classification of diseases and we eliminate it from our conception of eczema.

In sarcoptic scabies we are apt to find any and all the given symptoms of eczema, and the condition may be called eczema and treated as such until the microscope demonstrates the presence of the mange mite which is the cause of the disease. Remove the mite and the dermatitis rapidly improves, provided there is not too virulent an infection or abundant invasion of micro-organisms in to the skin (which seldom is a sequel of

mange), in which case the bacteria will have to be coped with. In distemper in dogs, when the skin lesion (dermatitis) is in evidence, it is commonly regarded as eczema and treated as such until the owner finds out the trouble is caused by distemper infection and the skin lesion is only one of the symptoms of distemper; then he forgets about the eczema and treats the dog for distemper.

The principal agents or conditions which tend to produce dermatitis of the dog are dust, dirt and parasites (fleas, lice, mange mites, flies, ticks and fungi), gastro-intestinal disorders (autointoxication, anaphylaxis from eating foods to which the body is sensitive, drugs, constipation, intestinal parasites), lack of exercise, unbalanced food rations, generally to much carbohydrates during hot weather, excessive or insufficient feeding, spoiled foods, infectious diseases (distemper), faulty action of the liver, kidneys or heart, washing with irritating soaps, excessive washings or using irritating dips, clipping (causing sunburn or freezing), disturbance of skin circulation by pressure or friction.

Symptoms: Generally a skin disease is most successfully treated when the cause is known, and the various skin diseases of the dog are no exception.

The microscope, enables you to separate parasitic from non-parasitic skin trouble, which is a start in the right direction.

A common form of dermatitis, appearing most often during the summer months, disappearing about the last of October or when the weather becomes cool, and which is seen upon the back, generally starting at the root of the tail, and commonly called fat mange, Summer mange or red mange (though it is not mange), one of the hardest conditions the dog owner has to contend with as far as skin trouble goes, outside of follicular mange. When it comes to prescribe a treatment for this condition the cause of the dermatitis should be ascertained first,

when the treatment may be rendered easy. When a doctor treats a patient with a cough he doesn't try to treat the cough; he tries to eradicate the cause of the cough. The same holds good in the treatment of skin diseases.

Treatment: The following treatment may help the dermatitis found in the Summer time, provided it is not caused by mange parasites. Keep the skin clean and free from parasites, exercise every day, give enough Epsom salts, dissolved in water, every other morning for about ten days, to move the bowels freely, but don't physic hard. If spot on skin is moist, dust frequently with equal parts of powdered boric acid, zinc sterate and lycopodium. If skin is dry and scaly, or cracking, keep covered with castor oil. Change diet; that is, if he has been fed on a diet lacking in meat feed more meat, or vice versa. If being fed too much food decrease the amount; if too little, increase.

A few dont's will possibly help to prevent skin diseases.

Don't allow parasites to collect upon the skin.

Don't allow the serum deposited on the skin, through the tiny punctures made by parasites or the biting or scratching of the dog or the invisible perspiration, to accumuate and act together with the various other substances found on the skin as a culture media for the development of bacteria or fungi, that help to destroy the epidermis and find their way into the lymph spaces and there reproduce their kind. Wash occasionally with a mild soap and keep the water out of his ears.

Don't allow him to become constipated.

Don't forget to give a physic, about twice a month, during the hot weather, whether you think he needs it or not, to ward off the effects of auto-intoxication. If he has worms get rid of them.

Don't use irritating mange mixtures on non-parasitic skin trouble.

Don't try to feed a dog without considerable meat in his diet and an occasional large bone.

Don't forget to exercise every day.

DISEASES OF THE EAR

The ear is a complicated structure the mechanism being enclosed in the skull. It is divided into the external ear, middle ear, and the internal ear. The latter contains the auditory cells and the termination of the auditory nerve the essential part of hearing.

The purpose of the external ear is to collect the atmospheric undulations. The middle ear is made up of a membrane or drumhead attached to several small bones, the purpose of the whole being to convey the aerial undulations to the fluid within the inner ear and as this fluid becomes agitated it stilmulates the nerve endings and gives rise in the nerve of hearing to those peculiar molecular movements which are conveyed to the cells in the brain concerned with hearing. Vibrations from the atmosphere or from solids usually act through the drum-head, but the auditory nerve may be affected through the bones of the head directly.

The middle ear is protected by the flap of the ear, by hairs within and a secretion of ear wax, which is bitter, sticky, admirably adapted to resist wet and is disagreeable to insects. The dog more than any other of our domestic animals is subject to diseases of the ear to most of which the term canker is conveniently applied.

Causes: Among the many are accumulation of the natural secretion, the spread of eczema and skin diseases, colds, digestive disorders, over feeding, insufficient exercise and exhausting illnesses. Field dogs frequently develop various ear troubles through the entrance of small seeds and it is also common among water dogs as a result of the exposures they undergo. In other cases the passages of the ears are invaded by pustules from distemper.

Symptoms: First redness, swelling, heat and inflamation, but only in rare cases are these symptoms noticed and attention is usually called to the animal's condition by his restlessness, shaking of the head and frequent scratching of the ear. Then upon examination the irritation is recognized. Inflammation runs into ulceration, which dries and forms scabs; pus sometimes forms which runs inward, irritates the drum-head and gives rise to inflamation of the middle ear. The pain and worrying, unless promptly relieved, affects the general condition of the patient. There is a form of canker due to small parasites that irritate the surface both of the flap and the canal of the ear. These vermin may be seen as whitish points. In all cases of canker of the ear there is an offensive odor and in most cases a characteristic discharge and the tendency of the disease is to irritate the innermost places of the auditory canals, and if the inflamation is not controlled it results in ulceration, the recovery from which is long and tedious and there is always danger of total deafness.

Treatment: Should be prompt, to prevent extension of the disease. Absolute cleanliness is of first importance, after which, if the dog shakes his head much, the flapping of the ears can be controlled by a special form of covering known as a "canker cap". In case, however, the dog worries too much while wearing this device, it is better left off and to prevent injuring the ear by scratching, the hind foot on the side of the affected ear should be covered with a stocking made out of cloth or soft leather.

In the first stage of redness bathe the parts with warm water and laudanum, after which the oxide-of-zinc ointment is useful on account of its soothing and drying properties. If the disease has worked into the canal, cleanse the ear with warm water using a good syringe. The water should be used as warm as it can be borne against the human cheek. The ear should then be carefully dried with absorbent cotton wrapped on the end of a

blunt stick. A mixture of acid carbolic one half dram, glycerine one-half ounce and water two and one-half ounces should be procured and a few drops dropped in the ear several time a day. Another excellent solution is acid carbolic one-half dram, zinc sulphate one dram, glycerine two drams, water to make six ounces. After cleansing with warm water three times a day inject a teaspoonful of the above. In many cases, particularly those of long standing, astringent powders blown into the ear prove more effective than liquid applications. Among these are the dry oxide of zinc and alum mixed with subnitrate of bismuth or finely powdered boracic acid For the parasitic form of the disease the yellow oxide of mercury, one grain to one dram of vaseline applied will effect a cure. In all cases the general health of the dog should be carefully looked after, the bowles relaxed and the patient given only easily digested food—ground cooked meat, and puppy meal, cooked vegetables, bread that has been thoroughly dried out in an oven and then broken up and softened with milk or meat soups.

Internal Canker

This disease, is an inflamation of the tympani or middle ear. It may arise from blows or other injuries usually it follows canker of the outer ear. In some cases it is impossible to assign a cause.

Symptoms: In the beginning the pain is very severe; the dog whines and slides his head along the ground. There will be no external signs of disease at first, but later pus is likely to issue from the ear and there are other symptoms of common canker. The causes of many cases of internal canker will be found in the mouth, such as a decayed tooth or some injury to the bone of the jaw. The termination of this disease is always problematical for there is danger of extension of the inflamation to the brain causing meningitis or the formation of

an abscess which will end fatally by pressure or blood poisoning.

Treatment: If this disease is not checked promptly it is liable to lead to the loss of the small bones of the ear, perforations of the drum-head and more or less deafness. The severity of the pain makes it necessary to use opiates and five or six drops of laudunum, depending on the size of the patient, should be given every two or three hours. During the inflamatory stage the bowels should be kept open by Epsom salts in doses of from one to three teaspoonfuls as may be necessary. In some cases relief will be obtained by hot applications to the side of the head; in other cases counter irritation such as painting, moderately with turpentine the back of the head and neck two or three times a day. Warm syringing will give relief and should be frequent, but immediately afterwards the ear should be filled with cotton wool dipped in a sedative solution or boracic acid dusted freely into the ear. If the discharge remains profuse after spraying the ear with warm water, inject an astringent solution of half a dram of alum to an ounce of water.

Polypus

This term is applied to diseased growths which originate near the drum of the ear, sometimes so large as to appear at the outer opening of the ear, completely blocking the cavity.

In appearance the common form is almost gelatinous, deep red in color with a rough and glistening surface. Usually they are exceedingly sensitive. There is another form extremely rare which is attached by a neck to the middle of the external ear. This form of polypus is colorless and fleshy in appearance. The surface is smooth, they are devoid of sensibility and are not attended by any discharge.

Treatment: If polypus is evident or suspected, a careful examination of the ear should be made with a specu-

lum and if possible secure the assistance and advice of a skilled aurist. Ordinary cases can sometimes be cured by cleanliness or by dusting freely with boracic acid or powdered alum. If an examination reveals a polypus that can be reached with a forceps or wire snare its removal is advisable immediately and the base can then be cauterized with nitrate of silver.

Affections of the Flap of the Ear

Frequently as a result of blows and tugging at the ear and sometimes as a result of shaking of the head induced by canker, abcesses are formed in the flap of the ear. These abscesses have the appearance of large blisters. They are usually watery in character and are sometimes complicated by eczema of the parts.

Treatment: If confronted only by an abscess without any diseased skin a large free opening should be made in the lowest part of the abscess and kept open until the sack heals from the inside. In cases of eczema of the flap of the ear it should be given the same treatment as for mange or eczema. If the external passage of the ear is affected and there is a dry scaly condition of the flap of the ear with more or less acute inflamation accompanied by scratching and frequent shaking of the head, the following treatment is recommended:

Zinci Sulphocarb. 6 gr.

Aquae 1 oz.

Drop in the ear three or four times daily. Another useful ointment for the external parts is Ungt. Hydrarg. 1 dram, Ungt. Simp. 3 drams. To be applied night and morning.

Deafness

Loss of hearing is sometimes the result of the organic changes which follow a bad case of internal canker, other cases are a result of constitutional disturbances and many cases are hereditary. Old dogs whose powers are failing become more or less deaf no less frequently than

humans. There is also a congenital deafness which is commonly met with among white bull terriers. In fact white dogs are more prone to deafness than those of other colors. Accumulation of dirt in the external ear passage may induce disease, and it is not unusual for puppies to be born with the sense of hearing entirely absent.

Treatment: In congenital cases nothing can be done to relieve the condition. If the drum of the ear has been perforated careful treatment will usually result in its closing with little impairment of the hearing powers. Nothing can be done to improve the hearing of aged dogs. Deafness that is due to an accumulation of dirt, wax, or both, can be cured by first dropping olive oil into the ear for two or three days and after this has softened the wax, syringe it all out with warm water and then dry the ear carefully with absorbent cotton. Dogs may be deaf in only one ear, but when born deaf both ears are usually affected. The sensibilities of dogs are so keen that it is sometimes difficult to determine positively whether or not they have defective hearing and the patient will have to be watched carefully.

DISEASES OF THE EYE

(Ophthalmia)

The mucous membrane that lines the inner surface of the eye-lids and covers the exposed portion of the eye ball is known as the conjunctivia. It is subject to injuries and inflammations that are referred to as opthalmia.

Causes: Those are many and varied. The commonest are the result of injuries such as scratches, blows, the lodging of foreign particles and inverted eyelashes. Various derangements such as colds, indigestion and bad blood are reflected in this membrane, while other causes are confinement in damp stables saturated with animal vapor and contact with purulent secretion.

Symptoms: In the common or catarrhal form of

opthalmia the first symptoms are an intolerence of light, an undue flow of tears followed by a thin purulent discharge which later becomes thick and sticky, there is more or less pain and the membrane red and swollen. In the acute form there is marked inflammation and a thick purulent discharge. The eyelids swell, are glued together, retaining the purulent secretion and constant local applications are necessary to keep the lids open. In severe forms of the disease there is fever, hot nose, prostration, constipation and other signs of inflammation. The disease is readily controlled in its milder form, but in the purulent form there is danger of ulceration of the eye ball and inflammation of the internal structure.

Treatment: Cleanliness is of the utmost importance and the eyelids should be continuously bathed with warm water and a soft sponge used to remove the discharge and thoroughly cleanse all parts. In milder cases, after carefully cleansing, a wash made of ten grains of borax to one ounce of camphor water should be used freely. The bowels should be freely moved by an active purgative and the diet reduced to milk, broth, well boiled rice and broken dogcakes. Inasmuch as the deeper structures of the eye are always in danger of a spread of the inflammation it is well to confine the patient in a darkened room. The following eye lotions can be used to good advantage: Boracic acid, 6 grains; Cocaine 5 grains, Sulphate of Zinc 2 grains; Rose Water 1 ounce. Directions, five drops in the eye three times a day.

Iritis

Suspended in front of the chrystaline lense is a thin, circular shaped, contractile curtain perferated by an aperture, the pupil, for the transmission of light. From its varied color it is named the iris or rainbow. Its action is to regulate the amount of light that is thrown upon the optic nerve. In strong light the pupil contracts and shuts out the superfluous rays and in feeble lights it

dilates to admit into the eye all the light that can be received. This delicate curtain is susceptible to inflammation, but it is rarely that inflammation is confined to the iris alone, the deeper structures being usually involved.

Causes: Various morbid changes in the blood are the usual causes, but it might be the result of injuries, over exertion or bad feeding.

Symptoms: An excessive flow of tears, intolerance of light, pain and restlessness are the common symptoms. The white of the eye changes to a bright pink. At first the iris becomes indistinct, then it loses its color, the pupil is contracted and the inner edges are irregular. Following this is the period of effusion and in some cases the film closes the pupil and in others it appears rusty.

Prognosis: In cases of recent origin the prognosis is favorable, but if the attack has been coming on slowly and insidiously for a considerable period of time, the chances of recovery are doubtful.

Treatment: Place the patient in a quiet, well ventilated, darkened room. Give an aperient of epsom salts, restrict the diet to milk, broth, and broken dog cakes. If there is much pain and the patient is restless, paregoric in teaspoonful doses can be given. It is important that the pupil of the eye be kept dilated to prevent adhesions and contractions. This can be accomplished by the sulphate of atropine, one grain to the ounce of distilled water. A few drops of this solution in the eye night and morning. After the inflammation has subsided the iodide of potassium is indicated three times a day. In the case of run-down systems, cod liver oil should be given three times a day.

Amaurosis

This term is applied to a peculiar glassy appearance of the eye, which, while it remains clear, loses it expression and becomes starey with more or less imperfect

vision depending upon the changes that are taking place in the deeper structures of the eye.

Causes: This condition usually arises from wounds and blows on the head, and may also be the result of long continued illness, severe digestive and liver disturbances, poisons or debilitating circumstances.

Symptoms: In most cases the uncertain manner and staggering gait of the animal first attracts attention and suggests dimness of sight and the disease and impairment of the vision progresses by slow degrees. First, the eyes show but little change from the normal, but later the pupils become dilated and the eye is clear and expressionless. In severe cases the sight becomes suddenly dim and the animal goes totally blind and in those cases where only one eye at first is affected, the other in sympathy becomes similarly diseased.

Treatment: The chances for recovery are least in those cases where the disease progresses by slow degrees and the chances for recovery are always much better in those that come on as a sudden attack. To improve the general health and treat the symptoms as they appear is all that can be done. Intestinal or digestive troubles should be overcome, a good vermifuge given for worms, if their presence is suspected.

Cataract

The Chrystalline lens is situated immediately behind the pupil of the eye. It consists of a transparent, highly elastic membrane filled with a clear fluid. It is a double convex body with a function similar to that of a lens in a magnifying glass and produces distinct perceptions of form and outline so as to accommodate the eyes' vision at various distances. A disease of this membrane or the fluid it contains is known as cataract.

Causes: Wounds or injuries to the lens, its capsule, or the eye itself as well as derangements of circulation and the general system may induce this trouble. There

are two forms of cataracts, the hard, which is peculiar to advanced age, and the soft, which is the result of conditions we have mentioned.

Symptoms: In cataract of the capsule there will be seen behind the pupil of the eye a non-transparent body of a gray or dead white color. In cataract of the lens the body will be blueish white or amber color. In hard cataract the cloudiness appears in the discolored lens and there is marked impairment of the vision before the grayness is evident.

Treatment: The knife of the surgeon is generally recognized as the only cure for cataract, but, as soon as changes are detected in the eye the cataract may be retarded by the use of tonics, good care and careful feeding.

Protrusion of the Eye Ball

As a result of fighting, blows or direct violence of some kind, there is occasionally a displacement of the eye ball from its socket and if there is no laceration of the attachments of the eye and the case be handled promptly it is not difficult to return the eye to its proper position. It should first be bathed with a weak antiseptic lotion to remove all dust and then lubricated with a very little vaseline. Have an assistant open the eyelids as widely as possible and with a pair of forceps draw the upper one well forward, then a firm, steady and gentle pressure on the eyeball, continued for some time, will return the eye to its socket. After replacement, a pad of absorbent cotton dipped in a lead lotion and then covered with cotton should be bandaged over the eye itself. This dressing should be covered with gauze and moistened from time to time so as to keep down inflammation. If the reduction, however, cannot be accomplished in this way, a surgean should be called in who can enlarge the opening by snipping the outer corner of the eye with a pair of scissors so as to enlarge the opening sufficiently

to allow the eyeball to re-enter. After the eye is returned, the lids should be drawn together by a stitch and the parts bandaged and constantly bathed with cold water until the inflammation has subsided.

Lachrymal Ducts

The glands which produce the tears, whose function it is to keep the eyeball and other parts clean and polished, are situated at the upper part of the cavity of the eye and opened by ducts upon the surface of the conjunctivia between the eyeball and the upper lid. In health, the movement of the lids spread the tears over the eyeball and then pass off through the lachrymal canals, which open into the nasal passages. A deficiency of tears result in a dryness of the eyes and in cases where there is an over secretion of tears it is generally due to an inverted eyelash or some foreign body. In other cases there are obstructions of the nasal duct, which results in a persistent watering of the eye, inflammations are set up following this, causing abscesses which break and leave a fistulous opening.

Treatment: In cases of over secretion of tears the eyes should be carefully examined for foreign bodies or inverted eyelashes. These should be removed and the eye bathed several times a day with a saturated solution of boracic acid. If the secretion of tears is scanty and the eyeball appears dry, a drop or two of glycerine should be placed in the corner of the eye once a day. Fistulus ducts require the attention of an experienced surgeon.

Eye Eczema

Frequently after distemper and occasionally in neglected and ill-fed dogs the eyebrows and the eyelids are affected with a troublesome eczema and in other cases the edges of the lids tend to inflame and remain in a condition of chronic irritation followed by exudation, scabs and loss of eyelashes.

Treatment: The lids should be bathed with warm soothing lotions such as borac acid and laudanum, then dried and annointed with vaseline and every attention paid to the general health and surroundings. In some cases it is often necessary to apply a mercurial ointment, either the red, oxide of mercury, three grains to one dram of vaseline, or the official nitrate of mercury ointment. Mercurial ointments will also kill the parasites which occasionally attach themselves to the edges of the lids. As it is very irritating, care must be exercised to see that the application is confined to the lids and does not enter the eye and it is also important that no other dog be allowed near the patient as he might lick off this ointment and be poisoned with mercury.

Granular Lids

Long continued irritation of the mucous membrane sometimes results in more or less prominent elevation on the inside of the lids. These irritate the eyeball and the cornea in particular.

Treatment: The upper lid can be averted by placing a small pencil or pen handle over it and then seizing the edges of the lid and lashes and turning it back. The lower lid can also be averted in a similar manner or simply drawn out. A solution of sulphate of copper should then be gently applied to the lid and immediately afterwards wash over the averted lid with a camels hair pencil dipped in water. Another useful application is an ointment made of the oxide of mercury, one to three grains to one dram of vaseline, a piece the size of hemp seed is sufficient for a single application.

DISEASES OF THE STOMACH AND INTESTINES

Acute Gastritis

This disease is an inflammation of the stomach and is usually of such intensity as to greatly endanger life. The

cause of the disease is not always obvious, some cases originate from systemic causes others are the result of the action of caustic poisons.

Symptoms: The most prominent symptom in acute gastritis is pain and vomiting. The stomach is unable to retain water and the matter vomited is usually a watery mucous of a greenish color frequently mixed with blood. The desire for cold drinks is excessive although it will immediately promote vomiting. There is great tenderness of the stomach and the animal stretches itself out on its belly. The nose is dry, respiration is hurried, the expression is anxious and the pulse is up. In fatal cases the prostration is severe, the pulse grows rapid and thready, the limbs become cold, the skin clammy, everything taken into the stomach is immediately expelled and death occurs either in a convulsion or from exhaustion. The symptoms are so severe that it is not easily mistaken for any other affection. If the poison is of a corrosive character vomiting of food is indicative.

Treatment: The contents of the stomach should be evacuated as promptly as possible. Rest for the inflamed organ should then be secured if possible by administering morphine in 1/10 grain doses dropped on the tongue and washed down with a teaspoonful of milk. This dose should be repeated for two or three hours if necessary. If morphine administered in this manner is not effective it should be administered with a hypodermic syringe. If the stomach yields to this treatment and the inflammation disappears the animal will be left in a very debilitated condition, tonic should be given such as tincture of iron, nux vomica, beef and wine. As a diet sour milk, sago pudding, bread that has been dried out in an oven and then softened with broth, and puppy meal are recommended in these cases.

Bowels (Inflammation)

May be the result of worms, indigestion, or a chill following exposure, and requires prompt treatment to prevent running into a more dangerous condition. Puppies whine, cry and are very restless, while adults are uneasy. Pressure on the abdomen causes pain, bowels are disturbed sometimes, constipated in other cases, and most frequently there is diarrhea, accompanied by the passage of much mucus. Vomiting is usually a symptom, the pulse is increased in frequency and harder than in health. In severe cases the thermometer will reveal a rise of temperature of from one to four degrees. In treating the first thing is to cleanse the bowels with a dose of castor oil—from half a teaspoonful to three tablespoonfuls—to which has been added from two to fifteen drops of laudanum. This is all the treatment many cases require. If, however, the pain continues, give the following mixture: Chloric ether three drams, liquor of bismuth four drams, water to make three ounces. The dose is from a teaspoonful to a tablespoonful every three hours. If the pain is severe the interval between doses can be reduced to two hours and a hot water bag applied to the abdomen.

Mix bone meal with the food and also treat for worms.

Bowels (Intussusception)

This trouble is of more frequent occurrence in puppies than old dogs. It is the result of the bowel telescoping upon itself. By careful manipulation of the abdomen it can be located by a long, hard swelling. The patient suffers much pain and usually whines and cries pitifully. The other symptoms are diarrhea, with blood-tinged mucus, and in the early stages vomiting. Intussusception is due to a variety of causes, such as worms, indigestion and colic, or the eating of hard substances, but as indigestion, colic and the abnormal appetite that causes

dogs to eat indigestible and irritating matter are all more or less the result of the presence of worms, the latter must be accepted as the primary cause. The importance of treating for them frequently is therefore apparent. Feed only liquid food—milk or beef tea. If there is not a decided improvement in the puppy's condition in twenty-four hours an operation should be resorted to. In the early stages it is nearly always successful and the puppy receives immediate relief. If it is postponed the operation is more difficult, on account of the inflammation, and the bowels cannot be so easily straightened. The patient should fast for twenty-four hours following the operation, after which for a few days administer only liquids.

Indigestion

This disease is of frequent occurrence among dogs. It is usually associated with disorders of other organs especially the liver, and is a low kind of inflammation of the mucous membrane of the stomach. It may follow an attack of acute Gastritis or proceed from excesses in eating.

Symptoms: A more or less constant thirst, tenderness over the region of the stomach, frequent attacks of vomiting, pain and other symptoms of indigestion.

Treatment: Careful hygenic surroundings and judicious feeding will have quite as much influence as medicine in curing this disease and should be much the same as recommended for indigestion. If the bowels become constipated, injections of soap suds will relieve them as purgatives are to be avoided.

The disturbances of the stomach and intestines which are sometimes referred to as dyspepsia are the result of changes in the gastric mucous membrane whereby the changes that the food undergoes before absorption are retarded and accompanied by numerous local and general conditions. This does not apply to those disorders which

are incidental to fevers, inflammatory affections or structural diseases of the digestive organs.

Causes: The indirect agencies, such as lack of sufficient exercise, over exertion, weakness of the digestive organs following inflammation, too much or too little food, or food of an unwholesome character are the most prominent causes.

Symptoms: The commonest sign of indigestion is impairment or entire absence of the appetite. The food taken into the stomach does not digest promptly, gases are generated, producing distention, vomiting occurs and the food is rejected in a more or less altered condition. In some cases it is mixed with bile and in others there will be streaks of blood. If the stomach is principally affected, the tongue will be coated, the nose hot and dry, the breath foul and the mouth filled with an increased salvatory secretion. If the intestines are affected, constipation, diarrhoea, abdominal distentions and colic are the prominent symptoms. In some cases there is fever and often the animal is dull, listless and depressed in manner.

Treatment: In simple attacks of indigestion, a day or two starvation or a simple diet of milk may be sufficient to control the disturbance, but if the attack is severe or of long standing, the first thing to do is to remove the contents of the stomach and intestines either by emetics or laxatives. The wine of epicac is a good emetic; the dose is two teaspoonfuls followed by one teaspoonful every ten minutes until vomiting has occured. As a laxative in these cases there is nothing better than calcined magnesia as it neutralizes the abnormal quantity of acid in the stomach. The dose is a teaspoonful and should be given in milk. After the stomach and the intestines have been emptied of their irritating contents be careful about the diet, do not overfeed at any time. On account of the weakened condition of the stomach there will be a liability to vomit in proportion to the amount of food

taken. As a diet the following is recommended: minced raw beef or ground cooked meat mixed with good puppy meal, vegetables such as well-cooked carrots, spinach, or turnips are good; sour milk is better than fresh milk; potatoes are to be avoided and bread should first be thoroughly roasted in an oven and then broken up and moistened with either soup or milk. Condition Pills three times a day will help tone up the system, and in all cases of weakened organs of digestion belching of gas, foul breath or disturbed bowels, mix calcarated compound with the food. It will overcome the acidosis and keep the stomach and intestines in a healthy condition.

INTESTINAL PARASITES

Worms

It is generally agreed that intestinal parasites cause more sickness and deaths among dogs than all other diseases combined including distemper. The varieties commonly met with are round, tape, whip and hook worms. Round worms commonly infect puppies, resemble angle worms in shape and size, pointed at both ends almost white or pale pink in color. When full grown they are from three to seven inches long, in puppies they are about half that length and as thick as a common white string. Round worms live in the small intestines sometimes coiled in such masses as to obstruct the passage, they also work their way into the stomach and are sometimes vomited or passed in the bowels.

The female round worm is marvelously productive and lays millions of eggs microscopic in size, with a tough gelatenous outer covering that protects them against heat and cold and enable them to retain their vitality for considerable periods of time. The eggs are deposited in the mucus that lines the intestines and the more of the mucus the better habitat for the worms.

If a dog in a kennel is affected with worms, thousands

of eggs will be passed with the faeces they become scattered all over the floors and bedding, get into the drinking pans, become mixed with the food, attach themselves to the dog's coat and through many channels gain en-entrance to the digestive tracts of other dogs, quickly hatch and promptly begin reproducing themselves. This rapid development accounts for the belief that puppies are born with worms, whereas they are not, but simply take the eggs into their stomachs soon after birth and it only requires a few days for them to hatch out.

Tape Worms: Many kinds of tape worms are more prevalent than ordinarily believed but they are not as common as round worms. As their name indicates, tape worms are made up of flat joints or sections like pieces of tape joined together in various lengths. The head of the tape worm is the smallest part, it is scarcely larger than a thread and has a sucker mouth with which it attaches itself to the intestines and through which it draws its nourishment. The tape worms does not lay eggs, like the round worm, but reproduces itself by the segments that form the body. These segments are smallest at the head as they recede gradually increase in size and are replaced by new segments until finally they become full grown or ripe they then detach themselves from the body and are passed in the faeces. Each one of these segments possess reproductive organs that produce the eggs which keep up the cycle of life. In time these segments disintegrate but the eggs then contain live and are scattered broadcast and in one way or another gain entrance to other animals.

Whip and Hook Worms: About one inch in length and the thickness of a pin with a tendency to curl up in the mucus membrane which makes their removal difficult. The hook worm is prevalent in moist warm climates. They inhabit the intestines and attach themselves firmly to the mucus membrane; their eggs are excreted with the faeces and under proper conditions

of warmth moisture and the absence of light retain their vitality for a long time; in warm damp soil they hatch readily but die in sunlight and dry soil. Many gain entrance to the system by the mouth, others penetrate the skin by setting up an inflammation sometimes called ground itch that is common among people who go barefooted in polluted soil. After penetrating the skin the larvae finds its way to the intestinal tract and begins over the cycle of life.

Symptoms: Worms are responsible for so much sickness and so many symptoms that it practically impossible to mention all of them, but their presence can safely be suspected in all dogs which have not been recently treated for them as well as in cases where the patient is run down, unthrifty and out of sorts.

Other symptoms are a hot, dry nose, weak watery eyes, pale lips and gums, foul breath, hacking cough and a red, scurfy, pimply or irrated condition of the skin and harsh, dry, staring coat that is constantly being shed. Wormy dogs sometimes have a depraved appetite and will eat dirt and rubbish. Some days they are ravenously hungry—the next day they will not eat at all; their sleep is disturbed by dreams and intestinal rumbling, urine is high colored and frequently passed, bowels irregular, stomach easily unsettled, watery mucous is frequently vomited and the mouth is hot, sticky and full of ropy saliva. Puppies which are full of worms bloat easily and are potbellied. After feeding their stomachs distend disproportionately to the amount of food consumed. Their bodies are also subject to scaly eruptions and their bowels to colicky pains; they do not grow as rapidly as healthy puppies should and instead of playing with each other, they curl up and sleep hour after hour; they get thinner, weaker and more lifeless from day to day and if they do not waste away or die in fits and convulsions with frothing at the mouth and champing of jaws, grows up coarse jointed, rickety and mis-shapen. Adult dogs infested

with tapeworms have ravenous appeties, but their food is misappropriated and they run down and become living skeletons.

Treatment: Preliminary treatment of the stomach and intestines of dogs infected with worms is of more importance than the vermifuge that is administered for their expulsion. In dealing with all varieties of worms, the fact must be kept constantly in mind that worms, particularly hook and whip worms, live in the mucus lining the intestines and curl up in the folds of the mucosa where it is impossible for the vermifuges to reach them. This accumulation of mucus produces a gaseous condition in which worms thrive. It also creates an acidosis and whenever the intestinal tract is in an acid condition the deadly histimine poison develops and is followed by fits, convulsions, and other systemic disturbances. The first thing to be done is to remove as much of this mucus as possible. This can be accomplished by mixing a teaspoonful of an alkalizing compound with the food twice a day. It can also be administered in the form of a tablet placed well back on the dog's tongue. After the preliminary treatment has been given for a week, a dose of castor oil—from a teaspoonful to a couple of tablespoonfuls depending upon the size and age of the patient, will cleanse the intestines and carry out many round worms and their eggs; the acidosis in which worms thrive will also be overcome and whatever vermifuge is now administered will have an opportunity to reach parasites they are to destroy.

In both puppies and old dogs, round worms are most frequently found and fortunately they are the easiest frequently found and fortunately they are the easiest to expell. Those that have not been removed by the calcarated compound and the castor oil are easily reached and castor oil. Turpentine is sometimes given but is always attended with more or less danger as it has a very irritating action on the kidneys.

Tape and whip worms while not as common as round worms are far more prevalent than usually believed. The preliminary treatment is the same as for round worms with the addition that the patient should be fasted for 24 hours before administering a tape worm capsule. Another useful remedy for these pests is an emulsion of pumpkin seeds. The dose is from one to three teaspoonful.

The hook worm was formally treated almost entirely with Thymol in doses from five to twenty grains of the triturate with twice as much milk sugar every hour for three doses. Epsom salts being given before the treatment and again two hours after the last dose of Thymol. In recent years carbo tetra chloride in capsule form has to a large degree replaced the Thymol treatment. It is a more powerful agent and must be used with care.

Prevention: This is very important and should not be overlooked in kennels. A continuous fight must be kept up against fleas and dirt; the kennel floors washed with boiling water; whitewash used liberally on walls and fences; and a disinfectant used daily. The calcarated compound mixed with the food will do much to prevent worms but in addition, puppies as well as old dogs should be treated every three months with a good vermifuge—treat brood bitches for worms and give them a bath two weeks before whelping so as to cleanse their coat of any eggs that may be attached to their breasts or coats. The passage of all affected animals should be promptly destroyed, feeding and drinking vessels scalded and kennel yards carefully drained and the soil mixed with lime, rock salt and ashes.

DISTEMPER

For years distemper has been the most dreaded of dog diseases. Its ravages are greatest among finely bred

dogs kept in kennels and household pets whose systems have been weakened by pampering and artificial conditions of life. It develops in dogs of all ages, usually about the time they are cutting their teeth, and one attack usually gives a certain immunity.

Causes: For many years the germ theory was accepted as the cause of distemper and bacteriologists devoted their efforts to locating a specific germ.

Their efforts have failed and the so-called distemper vaccines and serums which are on the market are simply a miscellaneous collection of nasal germs— what is known as a mixed treatment. The use of these serums is frequently followed by blindness, paralysis, chorea, and severe skin diseases, which indicates the danger of inoculating the system with a collection of germs of which there is no definite knowledge.

The most important advances made in medicine in recent years have been in a more complete understanding of the toxemias originating in focal infections. A group of eminent bacteriologists, working in this field for several years, have announced that distemper has its origin in a focal infection of the lower intestine that produces the deadly toxin, histamin. This poison as it is absorbed into the system causes an engorgement of the capillaries of the mebranes of the nasal passages, a mucocolitis derangement of the brain and nervous system, and other symptoms commonly met with in distemper.

Symptoms: The first indication of distemper is a rise in temperature, husky cough, shivering, loss of appetite and disturbed bowels. These, however, are frequently overlooked and no attention given to the patient until it refuses to eat, the eyes are weak and sensitive to light, and a gummy discharge collects along the corner of the lids; the breath is offensive, teeth furred and bowels disturbed, the stool being greenish, gaseous, and pungent. The thermometer registers two or three degrees above normal. In a day or two the temperature may return

to normal, but do not be too sure the patient is recovering, for all distemper cases are prone to relapses—the cough returning with increased severity and is followed by bronchitis or pneumonia. The chest is tender, the breathing is short and quick. The pulse will run up from 110 to 150. If it falls to 50 or 60, a more dangerous condition is indicated than when it is over 100.

Treatment: The management of distemper involves the exercise of good judgment and patience. A dog that has developed the disease should be confined in warm, comfortable quarters, and at no time exposed to inclemencies of the weather. If a puppy is affected, it will do no harm to allow an older bitch that has had the disease to remain with it for the sake of company.

The surroundings should be scrupulously clean, the air pure, and the windows shaded, as distemper patients avoid the light. The discharge from the eyes and nostrils should be removed by sponging gently with luke warm water; as the distemper germ has never been located, no reliance can be placed on serums, and the most distinguished veterinaries in the country have declared against their use. There are, however, certain toxic conditions that can be clearly recognized and rationally treated with remarkably satisfactory results.

In health, the reaction of the dog's urine is faintly alkaline, but in distemper it becomes highly acid; this also applies to the stool, which in addition becomes pungent and gaseous. It is evident, therefore, that in dealing with distemper, we have to overcome an acidosis and fermantative process in the colon. In view of the fact that the histimine poisoning is produced only in a high acid environment, the rational treatment is alkalization. Give a febrifuge every three or four hours and mix a teaspoonful of an alkalizing compound with the food twice a day, or a quarter of a teaspoonful can be placed on the back of the tongue four times a day. Its action in these cases is to sweeten the stomach and intestines

and overcome the acidosis that produces the histimine. If the nasal discharge is very severe and purulent, four or five drops of a 10 per cent. solution of argyrol should be dropped into each nostril, the head being held up to allow the fluid to flow into the throat, and the stool being watched to see if the argyrol has passed through. It is not necessary to repeat the argyrol. This alkalization treatment with calcarated compound has proven successful in most exacting laboratory and hospital tests, and if properly followed up, can be relied upon by dog owners as the most reliable treatment for this dreaded disease.

In regard to feeding: inasmuch as starches give high acid values, they should not be fed, the proper diet in distemper cases being well-ground, cooked beef, puppy meal, and bread that has been dextrinized by roasting in an oven. It can then be broken up and softened with beef soups or sour milk.

POISONS AND ANTIDOTES

The poisoning of dogs is frequently intentional, sometimes accidental and occasionally the result of owners administering large doses of drugs of which he has but an imperfect knowledge. The exterminators that are put out for rats and other pests are usually presented in a form that is just as palatable to dogs as it is to vermin and few dogs, no matter how carefully trained, can resist picking up refuse when not under the restraining eye of their owners.

The symptoms of poisoning appear so rapidly, are so urgent and the distress of the animal is so great, that one usually guesses at what has happened, for it is difficult to determine with accuracy what has been swallowed. Nevertheless, an attempt should be made to do so.

Poisons are divided into three classes. First: the irritant, the symptoms being great pain in the stomach, and the belly becomes tense and swollen. The sickness and retching are most severe, painful and distressing. There is vomiting or attempts at vomiting, and the matter thrown up is usually tinged with blood. Accompanying this at times is diarrhea and every evidence of the severe irritation that is being undergone by the intestinal tract.

Second: The Narcotic, the result of such drugs as opium and morphia, which act upon the brain and spinal cord causing sleepiness, giddiness and stupor, or as in the case of strychnine, convulsions and paralysis.

Third. Narcotic Irritants, which cause intense thirst, acute pains in the stomach followed by vomiting and purging.

Treatment: The first thing to do whenever a dog is suspected of having been poisoned is to encourage him to vomit and by emptying his stomach get rid of as much of the poison as quickly as possible. For this purpose

from five to twenty grains of the sulphate of zinc in water, followed soon after with a half to a teaspoonful of the wine of ipecac, will usually prove effective. Another speedy emetic is sulphate of zinc in doses of from three to ten grains. If these drugs are not at hand, baking soda or washing soda dissolved in lukewarm water or mustard and water will usually answer the purpose. At the same time it is well to drench the patient with lukewarm water. Frequently the poison will have been absorbed before the dog has come under observation. Then the object is to prevent further local effects and keep the patient from sinking; oil may always be given except in phosphorus poisoning which is rare. Calcined magnesia and lime water, powdered charcoal, whites of eggs and milk and flour are also useful as they are harmless and protect the stomach mechanically.

The poisons commonly met with are as follows:

Antimony

Usually given in the form of tartar emetic. The prominent symptoms are great thirst, retching and prostration.

Treatment: First an emetic accompanied by hot water to assist in evacuating the stomach. Follow this up with white of egg and water, or arrow root and milk, flour and milk, calcined magnesia. Next give stimulants and keep patient warm as the depression is great.

Arsenic

The commonest form of poisoning, as it is easily obtained and is frequently used for rats and other vermin. The symptoms are restlessness, acute pains, vomiting—the matter thrown up being brownish or mixed with pure blood. The symptoms are followed by great thirst, diarrhoea and an anxious expression of the countenance.

Treatment: Encourage vomiting by drenching with salt and water. Give warm water to drink; drench with milk and flour or with magnesia. After this has been done, the best antidote is hydrated oxide of iron, quickly pre-

pared by adding baking soda or washing soda to diluted tincture of iron so long as there is any effervescence. This may be given freely in doses of from a teaspoonful to a tablespoonful every ten minutes for an hour, then give caster oil. An hour later Carbonate of Bismuth can be given in doses of from ten to twenty grains applied to the tongue. If the animal strength is failing, give aromatic spirits of ammonia or carbonate of ammonium in small doses and apply hot cloths to the stomach.

Cantharidis or Fly Blister

This poison is usually taken accidentally being picked up, sometimes by a puppy, around a stable. The symptoms are great pain, restlessness and vomiting.

Treatment: Drench with warm water and salt followed by skimmed milk, white of eggs, barely water, magnesia, etc., but do not give oil or fat of any kind as it increases the activity of the poison.

Carbolic Acid

There is always danger of poisoning from lotions and ointments containing this much abused drug. Fortunately there is little danger of a dog swallowing it accidentally.

Treatment: Give a drench of olive oil or eggs beaten up as the action of carbolic acid is very depressing. Keep the patient warm. Use blankets and hot water bags, and administer stimulants.

Iodine

(Iodide of Potash, etc.) The Iodide of Potassium is easily absorbed by the human system which is almost immune to poisonous action from it. Dogs, however, are particularly susceptable to its influence and its long continued use, either in the form of the tincture of iodine applied externally or when administered in other forms intentionally sometimes, sets up severe gastric irritation with the attendant symptoms of ropy saliva, brownish tongue, extreme thirst, hacking and vomiting followed by diarrhoea.

Treatment: In acute cases empty the stomach with an emetic of the sulphate of zinc—3 to 15 grains in a quarter of a glass of water—followed in 15 minutes with a half to a teaspoonful of the wine of ipecac. After this acts give starch mixed with hot water, warm gruel stimulants and small quantities of cold water.

Lead and its Derivatives

Sugar of Lead is sometimes administered in mistake for salts and other drugs of like appearance. The Carbonate of Lead in the form of paint is sometimes swallowed in dry form, producing all the symptoms of an irritant poison, such as pain, extreme thirst, diarrhoea and occasionally more or less complete paralysis.

Treatment: Empty the stomach with an emetic such as the sulphate of zinc and the wine of ipecac. Give milk and raw eggs beaten up together. Follow this with a saline purgative to empty the bowels, and in severe cases, it is well to give a hypodermic of morphia or opium in some form. Directly the patient comes out from under the effects of the poison, give beef tea and other stimulants.

Mercury

This poison is easily obtained and dogs as well as humans are often poisoned by it either maliciously or accidentally, as it is readily absorbed and is the active principle of many ointments.

Symptoms: Great pain, thirst, vomiting, diarrhoea with bloody stools.

Treatment: The white of eggs and flour and water with demulcents should be given as a drench; followed by stimulants to counteract the depression and after this the veterinarian should watch the case carefully and meet various symptoms as they appear as the drug is only slowly elminated from the system. If the patient survives the attack the mouth will be corroded and should be treated with astringent washes.

Opium

The symptoms of this drug are drowsiness followed by deep sleep. The patient is aroused with difficulty and immediately relapses into a more or less comatose condition. An examination of the eye reveals the pupils contracted to mere dots.

Treatment: Give an emetic and then use all means to keep the patient awake. Drench with strong coffee or apply an electric shock to the spine.

Phosphorus

This is not an uncommon form of poisoning and is easily recognized by the extreme nausea and the odor of phosphorus to the vomit which in the dark will be luminous.

Treatment: First give an emetic of the sulphate of zinc, 5 to 20 grains in water, to encourage emptying the stomach. Repeat the emetic if necessary and add salt to the hot water. Do not give oil or fat in any form as it increases the activity of the phosphorus which it dissolves. Keep up the strength with beef tea, malted milk, gruel, etc. If the patient will not drink them, administer in tablespoonful doses.

Santonin

This is a favorite and powerful agent for the expulsion of round worms. It is the active principle of most vermifuges and is frequently administered in doses so large as to cause poisoning. In the case of puppies dangerous symptoms are frequently set up by even small doses and it is often the cause of convulsions and attacks of paralysis.

Treatment: In the case of convulsions following the administration of Santonin, give laudanum in the form of an enema in doses of from 10 to 20 drops. If the attack is not severe, an emetic in the form of the wine of ipecac, doses of from a quarter to a full teaspoonful, every ten minutes is all that will be necessary.

Strychnine

This powerful drug, the active principle of nuxvomica, is a component of many of the ordinary rat destroyers and vermin killers and is therefore one of the commonest form of poisoning that will be met with.

Symptoms: Extreme nervousness and great restlessness. The patient becomes highly excited; the legs and body jerk spasmodically; every muscle of the body is tensed; the head is drawn back and the tail is stiffened.

Treatment: It requires prompt treatment to save the patient. Give an emetic at once. If the mouth is clinched use a tube. Dry ipecac or tartar emetic can usually be placed on the tongue. To relieve the intense nervous strain and spasms give chloral hydrate (three to ten grains in water) and five to thirty grains of the bromide of potassium. At short intervals hypodermic injections of chloral are valuable and should be resorted to by the veterinarian.

Turpentine

There is no danger of a dog taking this drug voluntarily, but it is frequently administered as a worm destroyer and used so recklessly as an old fashioned kennel remedy that both old and young dogs are frequently poisoned by it.

Symptom: In some respects they resemble those of opium, the pupils of the eye being contracted; the breathing is stertorous, followed by coma and convulsions. The smell of the drug also can be detected in the breath and passages.

Treatment: First give an emetic of sulphate of zinc, three to twenty grains in hot water, followed by the wine of ipecac. Follow this with Glaubers Salts (a teaspoonful to a couple of teaspoonfuls in water). Then to relieve the pain, give laudanum (ten to twenty drops in water) or a hypodermic of morphia. Also give white of eggs, barley water, etc.